

## MAMMOMAT 300

**SP**

### Installation and Start-Up Instructions

#### Register 3

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## Meters and appliances, tools, notes

### Meters and appliances required

*NOTE!*

*Calibrated instruments are required.*

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- Line resistance meter 44 15 733 RV090.
  - Protective ground-wire tester 44 15 899 RV090.
  - Oscilloscope, e.g TEKTRONIX 314.
  - Digital multimeter incl. mAs meter.
  - Densitometer e.g PDA 81.
  - Service PC (e.g Siemens-Nixdorf PCD 3NSX/20 or similar) with connecting cable (PC-Generator), part no. 96 00 440 RE999.
  - Normi 7 test body (provided by the customer) or SIB phantom Type 42 001 (PTW or INAK).
  - Centring cross, part no. 96 60 051 RE 999.
  - Plexiglass plates, three plates measuring 150 mm x 150 mm x 20 mm and one plate measuring 150 mm x 150 mm x 10 mm, part no. 85 49 438 and 97 88 423 respectively.

*WARNING!*

*For safety reasons, the existing protective ground conductor in the power cord must under no circumstances be disconnected when operating the oscilloscope. For those measurements, in which any resulting ground loop may falsify the measuring result, use the differential amplifier (difference measurement).*

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### Tools required

- Standard installation tool kit.
- Torque wrench for bolting the stand/generator to the floor (optional).
- Electrical screwdriver with adjustable torque is recommended.

*NOTE!*

*Checks and /or adjustments, which must be made with X-ray radiation switched on, are marked with the radiation warning symbol:*



## Start-up, DHHS and X-ray decree area of application

### Important notes on start-up

The MAMMOMAT 300 is adjusted, programmed and tested in the factory, leaving only the adaption to the on-site mains voltage and the functional tests to be performed.

When the measurements to be made (kV, mAs, etc.) are within the tolerances stated in these instructions, this confirms that the settings made in the factory have not changed and the equipment is fully serviceable.

The measured values marked with >> in section 11 shall be entered in the test certificate provided.

The service PC is required only for programming according to:

- Section 11, **Checks with high voltage**
- Section 12, **Start-up and functional test of the Iontomat**
  - Programming the "Correction curve"
  - Setting the "sensitivity" (film density)
  - Setting the "sensitivity correction" (adaption to different exposure techniques)
- Section 13, **Further programming**
- Section 19, **Final procedures**
  - Recording the programmed values.
  - Reading the exposure counter and deleting the error memory.

*NOTE!* —————

*If the generator is switched off with the Service PC connected, wait approximately 5 seconds before switching it on again.*

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### Checking and recording for the area of application of the X-ray decree (§16 Germany)

In the area of application of the X-ray decree, an acceptance test certificate is supplied, with most of the data filled in by the factory.

Only:

- the cut-off dose
- the resolution of the film/screen systems used, and
- the output values of the constancy test

must be determined by the owner of the equipment and recorded in the acceptance test certificate. Furthermore, the front page of the acceptance test certificate must also be completed with the operator's data.

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## Checking and recording for the DHHS area of application

In the area of application of the DHHS regulations, maintenance measurements must be made according to the instructions "DHHS Maintenance Schedule and User's Spot Checks" RX B7-120.101... (included in the "DHHS Supplements to the operating instructions" RX B7-120.203...).

### Sections

- Required labels.
- Radiation ON indicators.
- Manual termination of exposure.
- Checking the maximum adjustable mAs with the following kV-values.
- Filters in beam limiting device (BLD).
- Reproducibility.
- kVp-accuracy.
- mAs-accuracy.
- Automatic exposure control (AEC).
- Coincidence of radiation field/image receptor.
- Alignment of light field/x-ray field.
- Illuminance of light localizer (light field).
- Shut-down of motor-driven compression movement.

The result must be recorded in "Measurement certificate" RX B7-120.037...

Some of the values to be determined can be taken from the acceptance test certificate.

The radiation-field limitation is set at the factory and recorded in the acceptance test certificate.

If the measurements to be made concerning the radiation-field limitation are within the tolerances stated in these instructions, this confirms that the settings made at the factory have not changed.

## Note on delivery state

The MAMMOMAT 300 has been tested and adjusted at the factory, and should therefore be ready for operation after completion of the installation.



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## Protective measures

Prior to any intervention in the equipment, disconnect it from the power supply with the main circuit-breaker.

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**WARNING!**

*If the system is only switched off at the control panel or with S2/D711, line voltage will still be present at the generator line connection, line filter Z1, Z2, transformer T1, transformer T10 and p.c. board D711 (see wiring diagram).*

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To prevent accidental triggering of high voltage cable and radiation, set the switch S2 (SS) on p.c board D702 to "OFF" (lower position) (no triggering of the SS relay).

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**WARNING!**

*After shut-down of the system, there may still be about 380 V DC present on the intermediate circuit. This will be indicated by LED V24 on p.c. board D 710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.*

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**CAUTION!**

*The p.c. boards contain electrostatic highly sensitive components requiring particular care in their handling (ground before making contact and place only on a conductive surface, see Technical Information TI 219).*

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Before removing or inserting a p.c. board, switch off the equipment.

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## General

### Scope of delivery

The MAMMOMAT 300 is packed in one crate and one cardboard box:

#### **Crate (length 2140 mm, width 800 mm, height 1375 mm)**

The crate contains:

- Compression plate.
  - Object table (Bucky)
  - Diaphragm
- } packed together in a separate box
- Stand with X-ray tube assembly and base plate.
  - Cover panels
  - Installation material
  - Miscellaneous small parts
  - Stanchions for the lead-glass pane (radiation shield).
  - Cable ducts
  - Technical documents

#### **Cardboard box (length 1210 mm, width 820 mm, height 700 mm)**

The cardboard box contains:

- Generator with integrated control panel, high-voltage generator and base plate.
- Lead-glass pane

### Unpacking

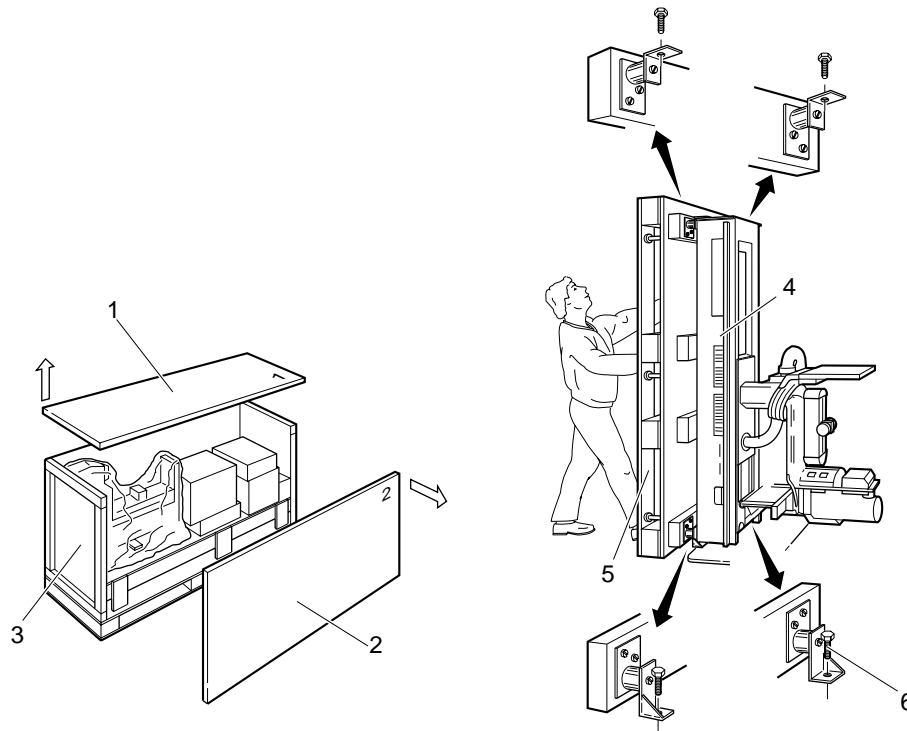
As a general rule, the directional marks on the crates should be observed during transport, storage and unpacking.

The stand crate is bolted together, while the cardboard box is secured with plastic straps.

**CAUTION!**

*Wear safety footwear.*

## Unpacking the stand



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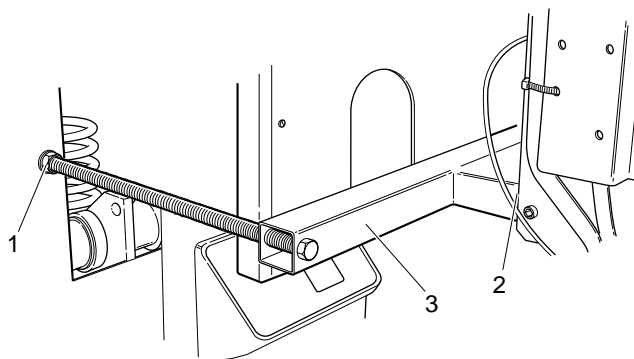
*Figure 1 Unpacking the stand*

### Unpacking

- 1 Open the stand crate by removing the top (1) and then the side wall (2).
- 2 Take out all enclosed packages (accessories, installation material, cover panels etc.) from the crate.
- 3 Remove the wooden supports.
- 4 Remove the remaining walls (3).
- 5 Upend the stand (4) , with pallet (5) (two persons are required).
- 6 Loosen the four bolts (6) and remove the pallet (5).

## Removing the transport safeguards

### Removing the swivel-arm system transport safeguard



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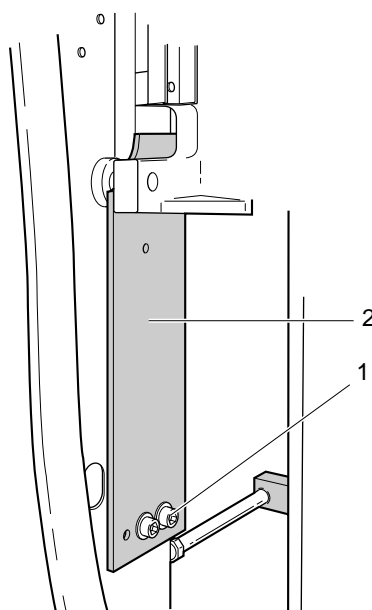
*Figure 2 Swivel-arm system transport safeguard*

- 1 Loosen the transport safeguard nuts (1) and remove the tube head screws (2).
- 2 Push the red transport safeguard (3) inwards, away from the tube head.

**NOTE!**

*Removal of the swivel-arm system transport safeguard is done after the equipment has been powered up, see further section "Attaching the swivel-arm covers", page 8-1.*

### Transport safeguard for the lifting carriage



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*Figure 3 Transport safeguard for the lifting carriage*

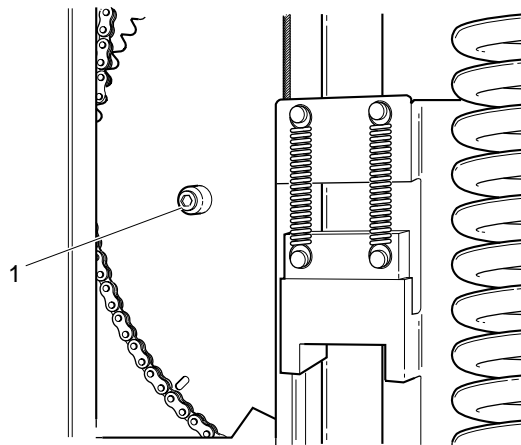
- 1 Loosen the two screws (1) and remove the red transport safeguard (2).

*NOTE!*

*The lifting carriage transport safeguard shall be kept for service purposes.*

- 2 Cut and remove the cable tie securing the balancing spring during transport.

### Transport safeguard for the rotary motion

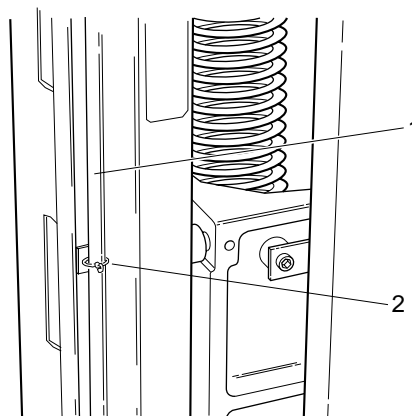


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*Figure 4 Transport safeguard for the rotary motion*

- 1 Remove the transport safeguard screw (1) to enable rotary motion.  
The screw (1) should be kept for future need.

### Protective strips for the metal curtain



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*Figure 5 Protective strips for the metal curtain*

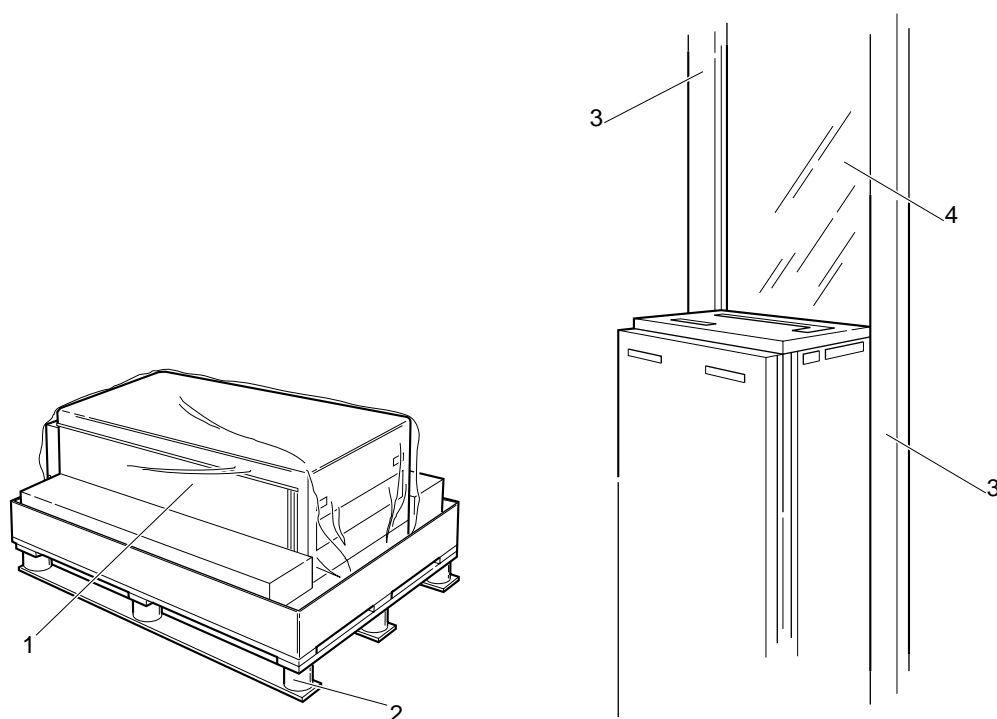
The edges of the metal curtain are very sharp and are therefore provided with protective strips (1) on delivery. These strips must always be applied onto the edges of the metal curtain during service and maintenance work.

## CAUTION!

*The protective strips must be removed from the metal curtain before any vertical adjustment of the swivel-arm system is performed.*

Holders (2) for storing the protective strips when not in use, are provided on both sides of the curtain, see *Figure 5*.

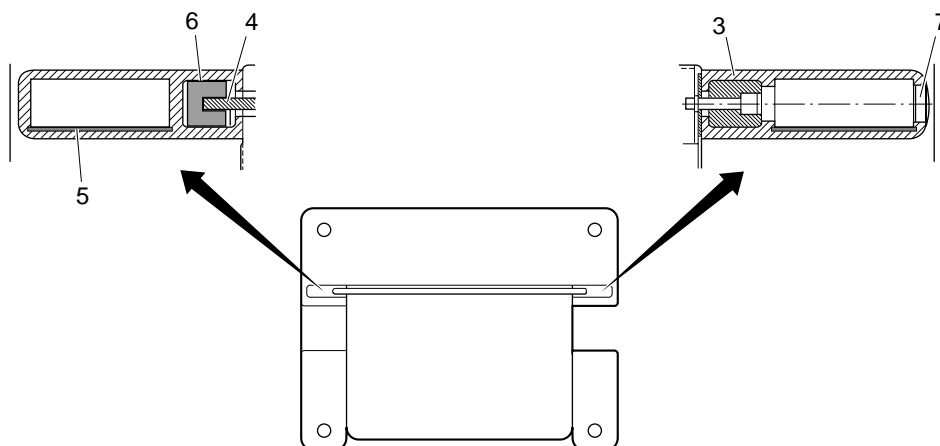
## Unpacking the generator and mounting the radiation shield



*Figure 6 Unpacking the generator*

- 1 Open the cardboard box by cutting the plastic straps.
- 2 Lift out the lead-glass pane and put it away in a safe place.
- 3 Remove the protective cover from the generator.
- 4 Upend the generator (1) and lift it off the pallet (2) (two persons are required).
- 5 Mount one stanchion (3) for the lead-glass pane (4) onto the generator.



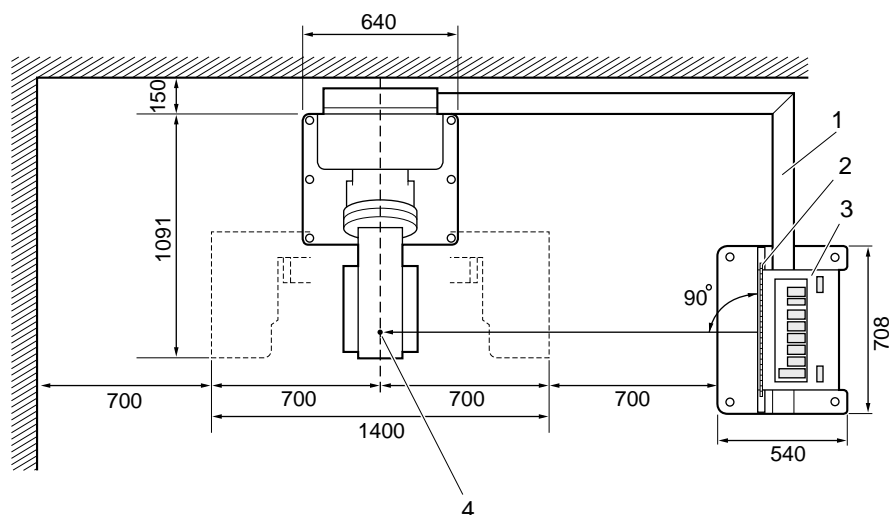


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- 6 Insert sheet-metal strip (5) (additional radiation protection) and vibration absorbing strip (6) into both stanchions.
- 7 Fit the lead-glass pane (4) into the groove of the stanchion and keep it in position while mounting the other stanchion onto the generator.
- 8 Cover the holes with plastic caps (7).

## Arranging the components

- 1 Position the stand and the generator in accordance with installation plan and *Figure 1* below.



MAM00088

*Figure 1 Installation, top view*

Cable duct (1) and generator (3) with radiation shield (2) can be installed optionally to the left or to the right of the stand. Maximum cable length between stand and generator is approximately 3.5 meter.

Radiation shield (2) perpendicular to visual line between generator and focus of the tube head (4) according to *Figure 1*.

Recommended minimum distance to wall and generator base plate respectively is 700 mm (shorter distances may be used at the customer's desire, if in compliance with local regulations).

For the installation of the cable duct, a minimum distance of 150 mm between wall and stands is required.

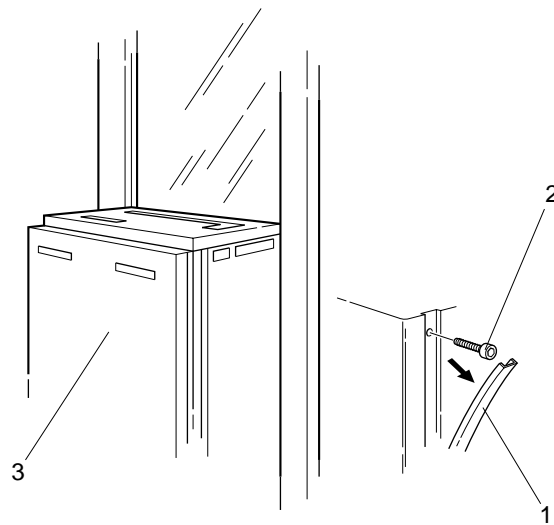
## Removing the generator cover

- 1 Pry loose the plastic strip (1) and remove the sixteen screws (2), eight on each side.

**NOTE!**

*Pay special attention to the contact washers (there are four contact washers on either side). They are needed again when reassembling the front cover to establish protective ground connection and to fulfil EMC (Electro Magnetic Compatibility) requirements.*

- 2 Remove the front cover (3) from the generator.

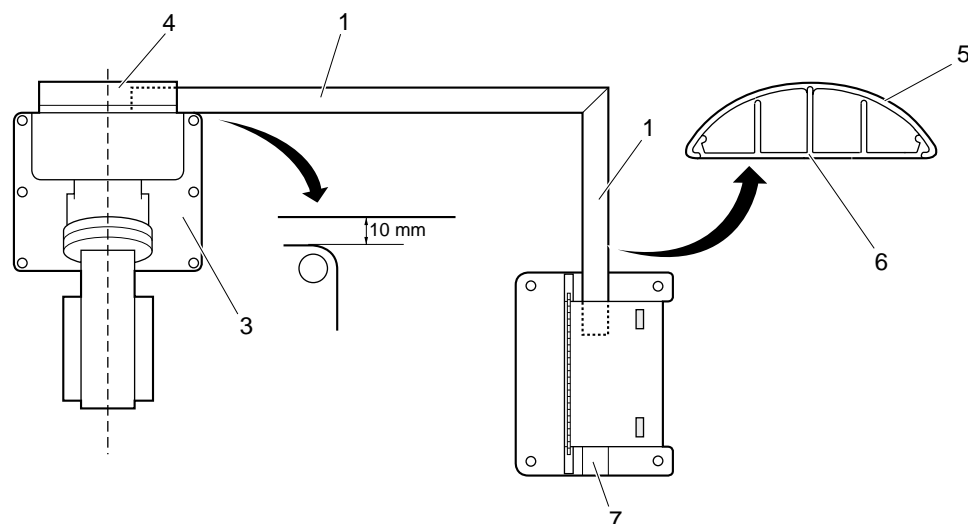


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*Figure 2 Removing the generator cover*

## Installing the cable ducts

- 1 Position the cable ducts (1) to the stand and the generator respectively.
- 2 Leave sufficient space, approx 10 mm between the cable ducts (1) and the base plate of the stand (3) to allow for the mounting of the cable outlet cover (4).
- 3 Check that the cable duct (1) is slightly overlapped by the cable outlet cover (4).



*Figure 3 Installing the cable ducts (top view)*

- 4 Mark the outlines of the cable ducts (1) on the floor.
- 5 Cut the bottom of the cable ducts (6) and the cable duct cover (5) to proper length.

**NOTE!**

*Figure 3 shows a right-angled installation of the cable ducts. If the generator is to be installed at an other angle to the stand, you just have to cut the cable ducts correspondingly.*

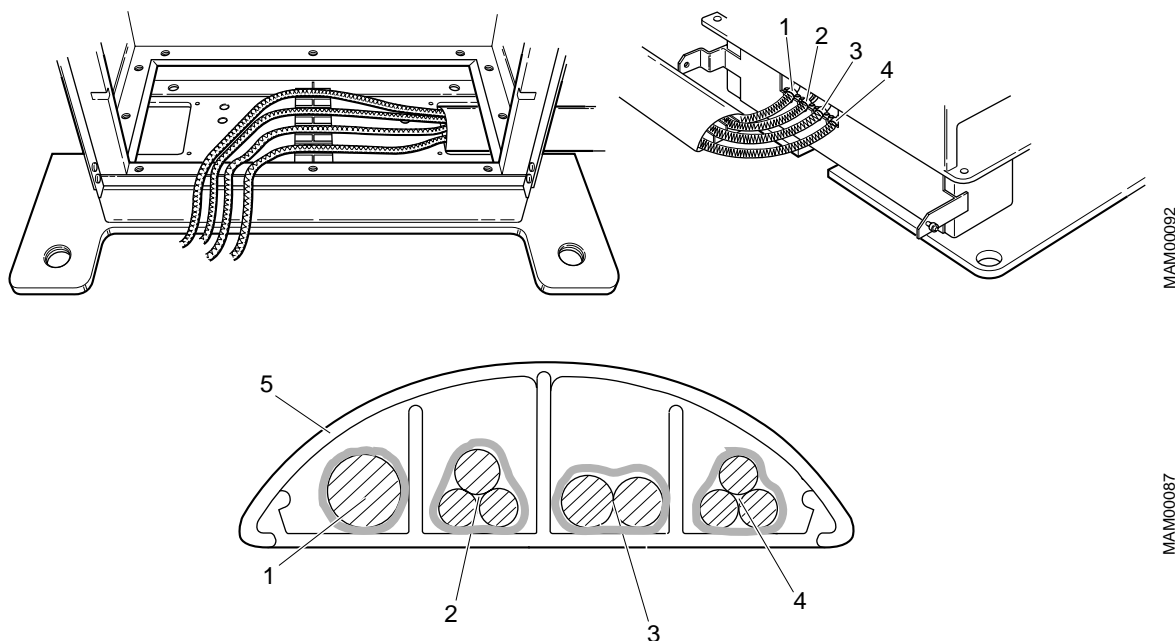
- 6 Fasten the bottom plate of the cable ducts (6) to the floor according to marking, using double-sided adhesive tape.
- 7 Cover the cable entry at the generator that is not used with the enclosed cover plate (7).

## Laying the cable harness

### NOTE!

Remove the transport safeguards which consists of cable ties (four around the cable harness and one around each shield cable end).

- 1 Separate the cable harness.
- 2 Lay the stand cable harness in the cable duct, as shown in *Figure 4*, all the way to the generator.



*Figure 4 Laying the cable harness*

The cable harness consists of four shield cables, see *Figure 4*.

Pos in fig. 4	Description
1	High voltage cable H1.
2	IONTOMAT signal cable X11. Unit control cable X1. Power supply cable X14.
3	Anode rotation cable X9. Filament cable X8.
4	Mains supply cables: L1 L2 Protective ground.

- 3 Fit the cable duct cover (5) on the cable ducts.

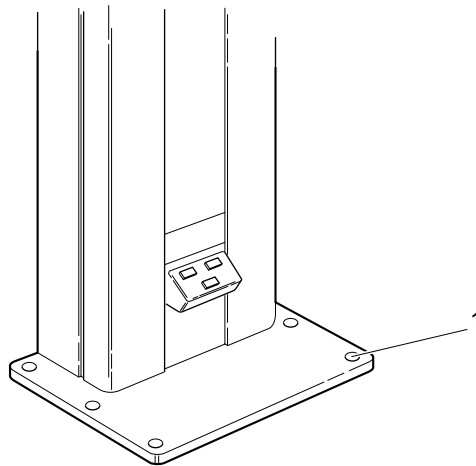
## Aligning the stand

- 1 Align the stand vertically by means of the levelling screws (1) .  
For adjustment of the levelling screws, use a ratchet spanner 1/2" with extension (without socket).

**NOTE!**

*It is important that all six levelling screws bear against the floor to ensure optimum stability of the stand.*

- 2 Cover the levelling screws with the cover discs supplied.



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*Figure 5 Levelling screws*

**NOTE!**

*If bolting to the floor is required, please refer to section 20 page 1.*

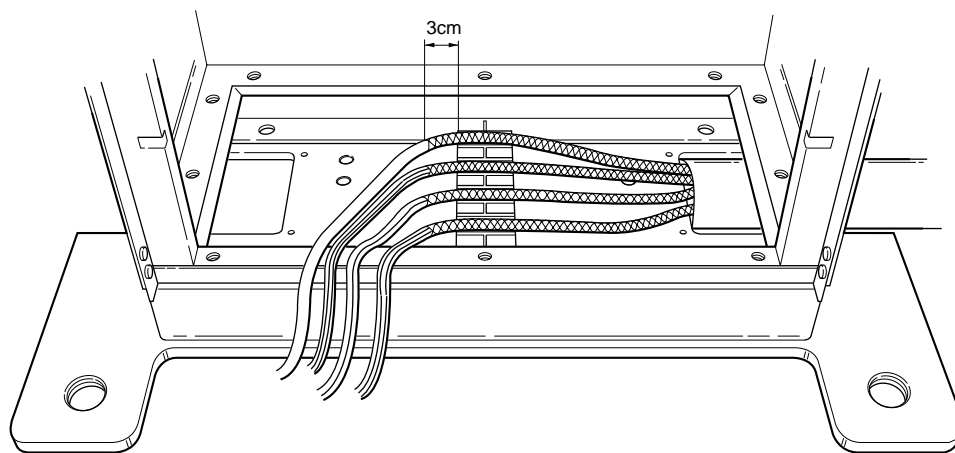
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## EMC measures

The following measures are required to ensure electromagnetic compatibility of the equipment.

## EMC measures at the cable entry

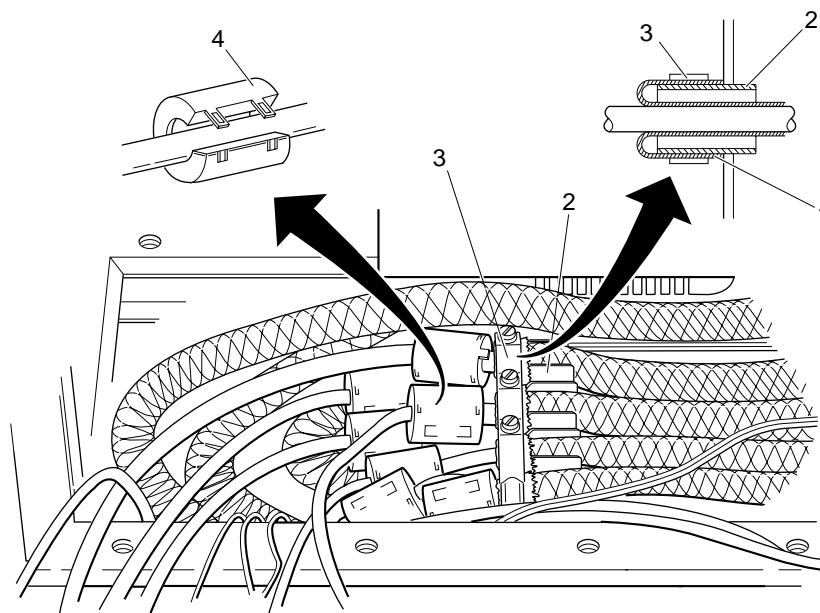
### Fitting the hose clamps and ferrite sleeves



*Figure 1 Cables from the stand*

- 1 Lay the cable harness from the stand to the generator and leave approximately 3 cm of the shielding at the U-bracket, see *Figure 1*.  
If the cable harness is too long put away free cable length as shown in *Figure 2*.
- 2 Fit on a hose clamp (3) on each cable.  
Hose clamps are included in the delivery.
- 3 Fold the shield braid (1) backwards over the U-bracket (2) on each cable and clamp with a hose clamp (3).





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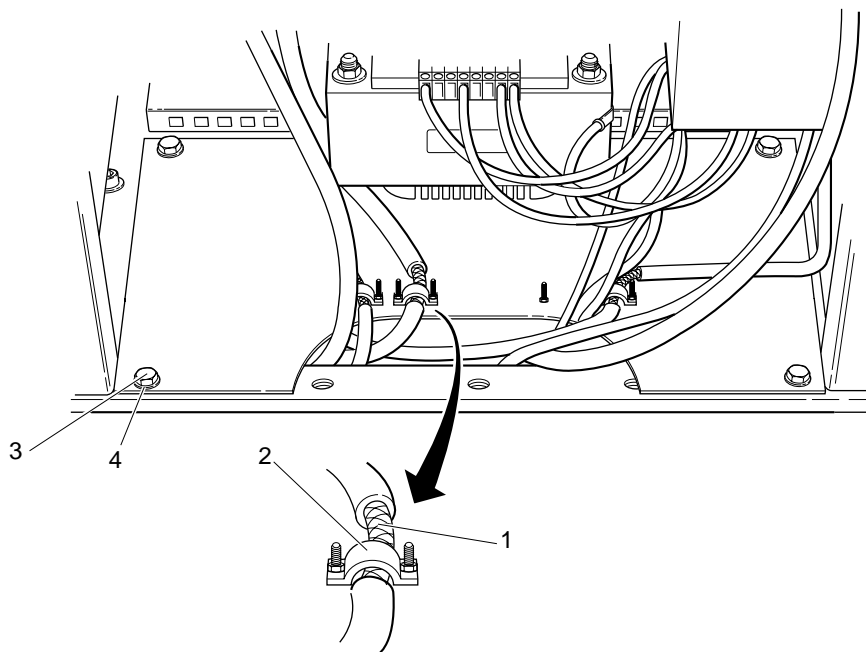
*Figure 2 Ferrite sleeves and hose clamps*

- 4 Provide each incoming cable with a ferrite sleeve (4) except for mains supply cables L1 and L2 and the ground wire which shall be laid together in one and same ferrite sleeve. Ferrite sleeves are included in the delivery.

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## EMC measures on the bottom plate

### Fitting the cables X1, X8 and X9 on the bottom plate



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*Figure 3 Bottom plate*

- 1 Fit the bottom plate at the bottom of the generator stand as shown in *Figure 3*.
- 2 Carefully cut away the insulation on cables X1, X8 and X9 to lay bare the shield braid (1).
- 3 Select proper clamps (2) with regard to the thickness of the cables, cable clamps in different sizes are provided on the bottom plate.
- 4 Fit the clamp (2) over the shield braid and screw tight to ensure satisfactory contact between shield braid and clamp.
- 5 Install and tighten the four screws (3) and contact washers (4) at the bottom plate.

**NOTE!** —————

*Cable X9 shall be clamped to the side wall of the cabinets, if this is not already done see Figure 7 in this section.*

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## Connecting the stand cable-harness

### The high-voltage connector, alternative types

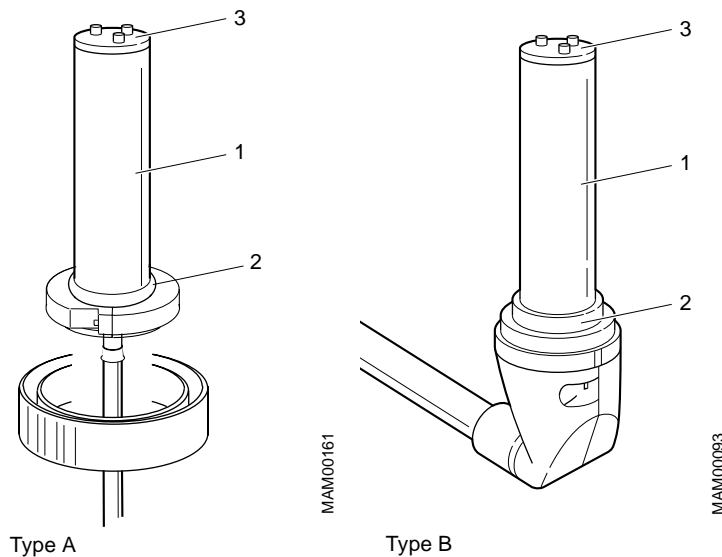


Figure 4 The high-voltage connectors, alternative types

**NOTE!**

The high-voltage connector (1) is factory-adjusted for correct fit. Mount the angular cable-sleeve halves and sleeve nut (Type B only). The high-voltage connector shall be inserted with silicone oil, silicone-rubber ring (2) and silicone-rubber disc (3). Lubricate the silicone-rubber disc and the pins with silicon oil before mounting the disc. Make sure that there aren't any air bubbles between the disc and the connector.

## Connecting the high-voltage connector

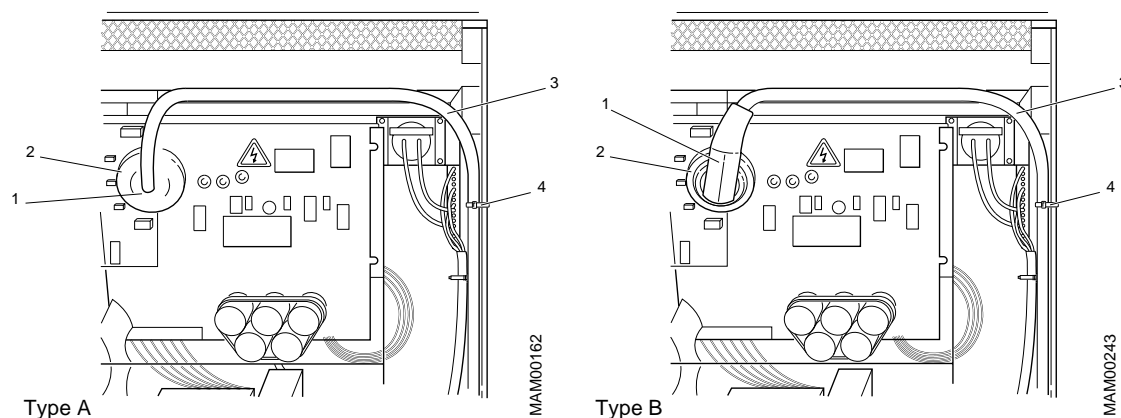


Figure 5 Connecting the high-voltage connector

### Type A

- 1 Plug in the high-voltage connector (1) at H1.
- 2 Tighten the sleeve nut (2) by hand.
- 3 Tighten the stop screws on the sleeve nut.
- 4 Position the high-voltage cable (3) to the right in the generator and fasten with cable ties (4).

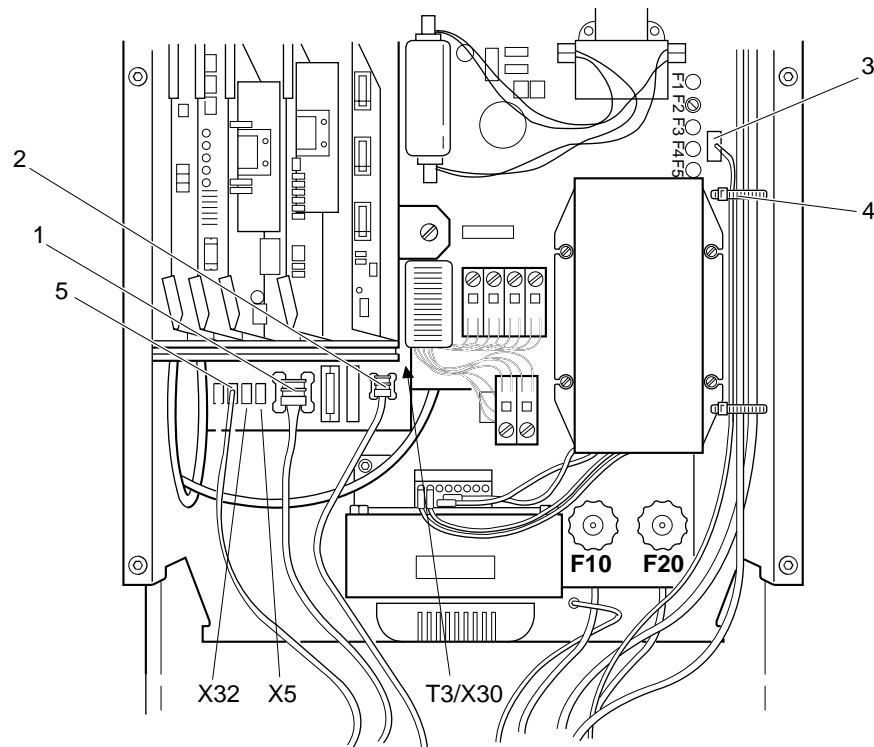
### Type B

- 1 Plug in the high-voltage connector (1) at H1.
- 2 Tighten the sleeve nut (2) by hand.
- 3 Position the high-voltage cable (3) to the right in the generator and fasten with cable ties (4).

## Connecting the cable harness to the generator

**NOTE!**

Required EMC measures are described on page 1 in this section.



MAM00102

Figure 6 Cable harness at the generator

### Unit control cable X1

- 1 Connect the unit control cable X1 to D700 X1 (1).

### Filament cable X8

- 1 Connect the filament cable X8 to D700 X8 (2).

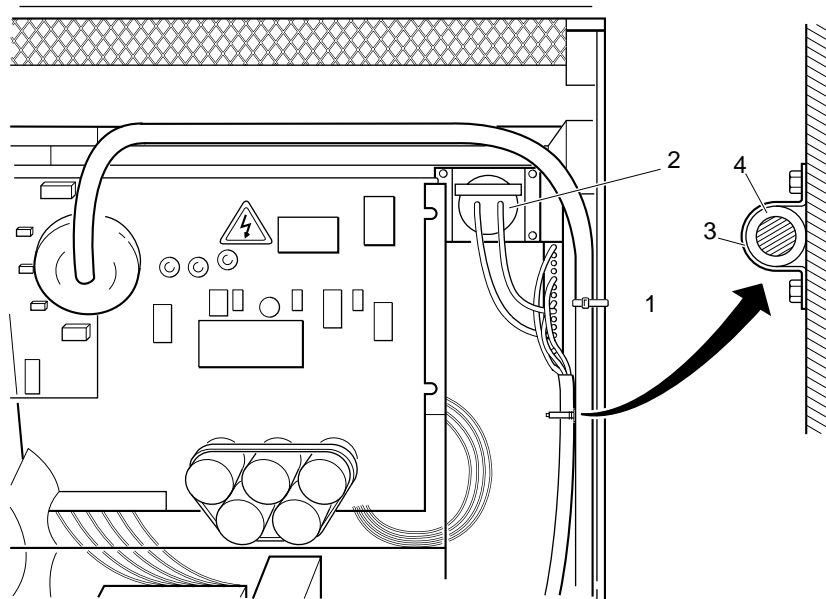
### Power supply cable X14

- 1 Connect the power supply cable X14 to D711 X14 (3).
- 2 Strain relieve it on the side with a cable tie (4).

### IONTOMAT signal cable X11

- 1 Connect the IONTOMAT signal cable connector X11, to D700 X11 (5).

## Rotating anode cable X9



MAM00163

*Figure 7 Connecting X9 to the generator*

- 1 Connect the rotating anode cable X9 to D711 X9 (1).
- 2 Connect the two blue free wires from connector D711 X9 (1) to capacitor C51 (2).
- 3 Fit the cable to the chassis by using a cable clamp (3).

### **CAUTION!**

*When fitting the cable clamp, ensure satisfactory contact between shield braid (4) and chassis.*

## Mains connection

The equipment has been set to **400 V, 2-phase, in the factory (see test certificate)**. Adjustment to the line frequency is not needed. If the mains voltage is not 400 V, 2-phase at the installation site a reconnection of the mains is necessary.

Should a reconnection for the mains voltage be necessary, this must be done at transformer T10 as well as p.c. board D711 (insertion or removal of fuses and labeling is specified in the wiring diagram, see Line Input page 5-3).

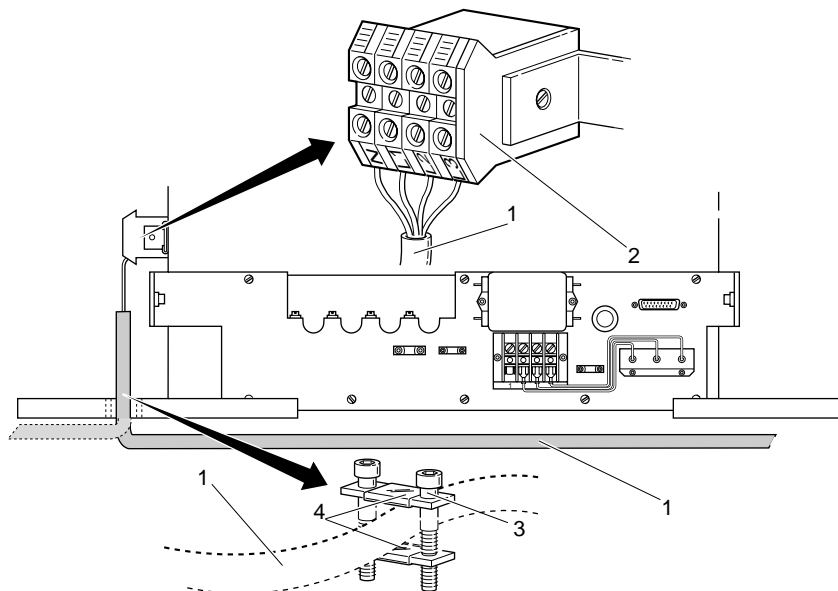
Change the rated voltage labels to the correct voltage (there are two labels on the generator and one on the stand). Labels are included in the installation material.

**NOTE!**

For more details about changing mains, removal of short circuit, fuses and labeling, etc see Wiring Diagram.

## Connecting the incoming mains to the stand (400 V, 2-phase)

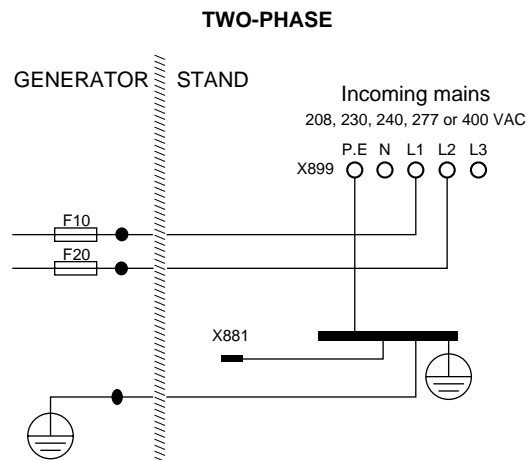
### 400 V 2-phase connection



MAM00097

*Figure 8 Incoming main cable*

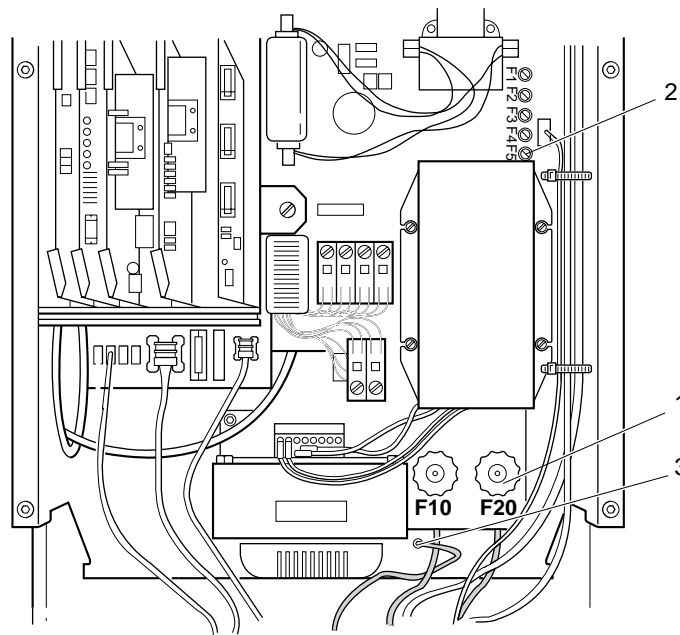
- 1 Connect the incoming mains cable (1) to X899 (2) in the stand as shown in *Figure 8* and *Figure 9*.
- 2 Fit plastic tubes (4) on the plates.
- 3 Strain-relieve (3) the incoming mains cable.



MAM00095

*Figure 9 Incoming mains 2-phase*

## Connecting the mains supply to the generator (400 V, 2-phase)



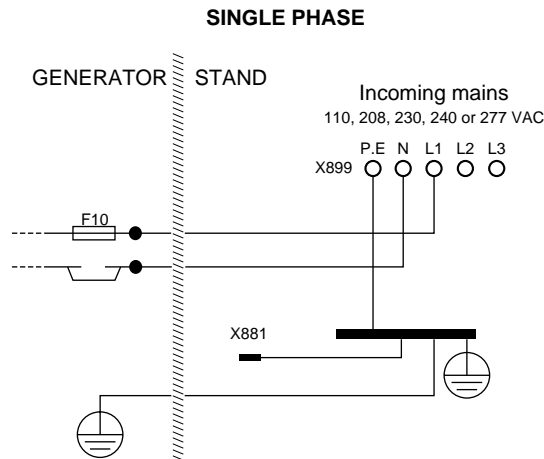
MAM00103

*Figure 10 Mains supply to the generator*

- 1 Check that there is no wire jumper at F20 (1) and no brass plug at F5 (2).  
Fuses must be inserted into fuse holders F20 and F5.
- 2 Connect the mains supply cables between stand and generator to fuses F10 and F20 on the generator.  
Wire marked L1 to F10 and L2/N to F20.
- 3 Connect the protective ground wire from the stand to the generator (3).



## Measures for changing from 2-phase to 1-phase connection



MAM00096

*Figure 11 Incoming mains 1-phase*

- 1 Move wire marked N/L2 from X899 L2 to X899 N (stand).
- 2 Connect incoming phase of the power supply to L1 and the neutral conductor of the power supply (0 V) to N and fuse F20.
- 3 Strain-relieve the incoming mains cable as shown in *Figure 8*.
- 4 Short circuit F20 (1) and F5 (2) in *Figure 10* with the jumper and brass plug included in the service bag.

**CAUTION!**

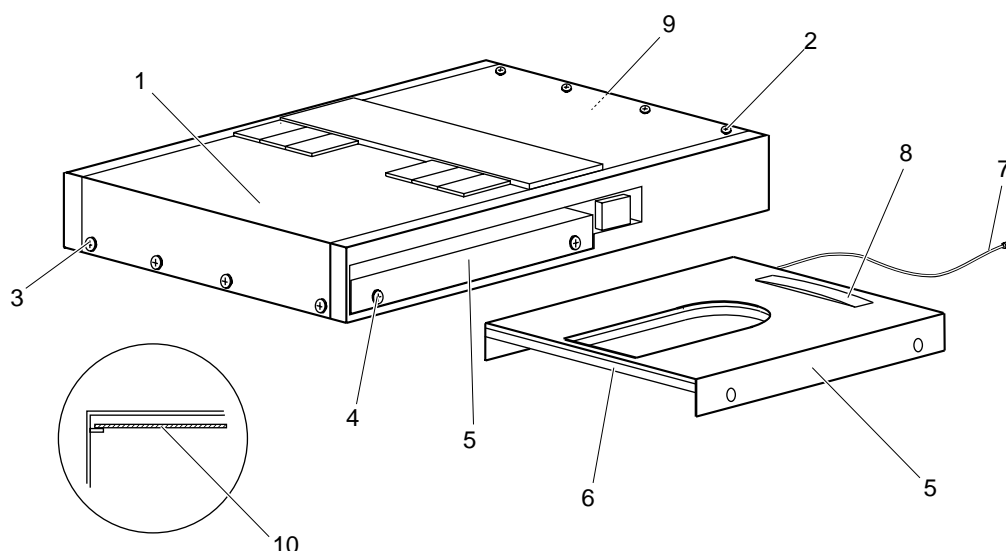
*For single-phase mains connection, make sure that the neutral conductor of the power supply (0V) is connected to terminal N and fuse F20.*

**NOTE!**

*Connections on transformer T10 must be adjusted according to actual voltage, for details see *Wiring Diagram*.*

## Modifying the 18 cm x 24 cm object table for thick cassettes

If thick cassettes are to be used, the 18 cm x 24 cm object table must be modified as follows (see also separate instructions enclosed with the object table).



MAM00104

*Figure 1 Modifying the object table*

- 1 Remove the carbon-fibre plate (1) by unscrew four long screws (2) on the top side and four short screws (3) on the front side.
- 2 Remove the four screws (4), two on each side.
- 3 Withdraw the steel bottom plate (5) and the spacing plate (6).
- 4 Install the new steel bottom plate and spacing plate included in the package.  
Be careful with the switch and wire (7). Make sure that the switch actuator (8) is in proper position.
- 5 Fasten with screws (4), two on each side.

**NOTE!**

*It is recommended that the spacing plate and bottom plate not in use be kept for future need.*

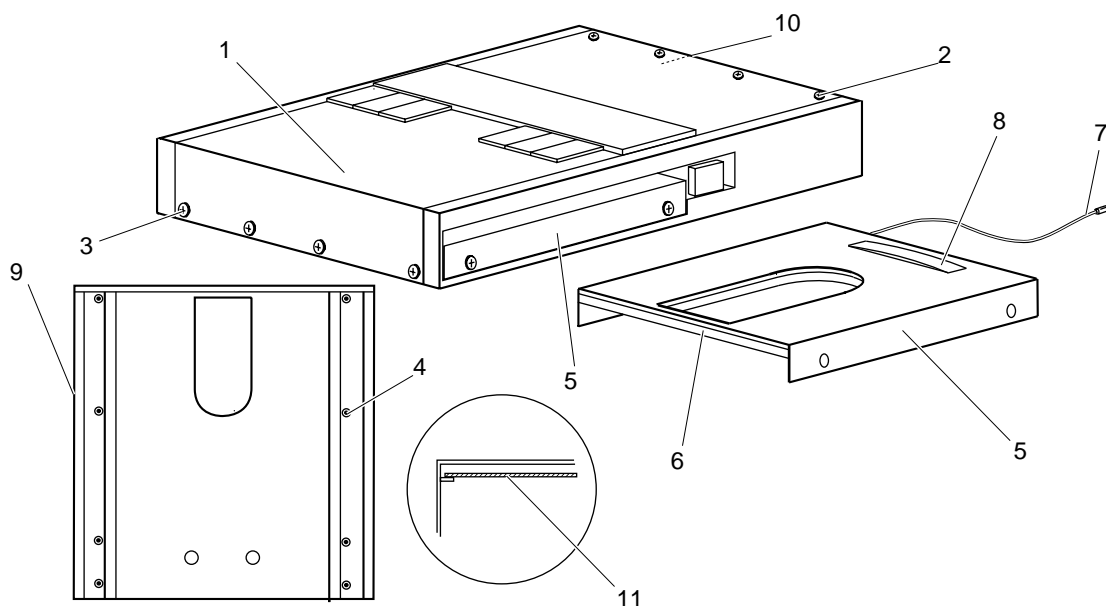
- 6 Mount the carbon fibre-plate (1) and pay attention to the brass grounding strap (9).

**NOTE!**

*Before mounting the carbon-fibre plate, make sure that the grid is properly positioned on the support (10).*

## Modifying the 24 cm x 30 cm object table for thick cassettes

If thick cassettes are to be used, the 24 cm x 30 cm object table must be modified as follows (see also separate instructions enclosed with the object table).



MAM00105

Figure 2 Modifying the object table

- 1 Remove the carbon-fibre plate (1) by unscrewing four long screws (2) on the top side and four short screws (3) on the front side.
- 2 Remove the six nuts (4) on the underside.
- 3 Withdraw the steel bottom plate (5) and spacing plate (6).
- 4 Re-insert the steel bottom plate (5) with the new spacing plate included in the package into the object table.  
Be careful with the switch and wire (7). Make sure that the switch actuator (8) is in proper position.
- 5 Secure the assembly with the six nuts (4).  
Be sure the grounding spring (9) is in place.

**NOTE!**

*It is recommended that the spacing plate not in use be kept for future need.*

- 6 Mount the carbon-fibre plate (1) and pay attention to the brass grounding strap (10).

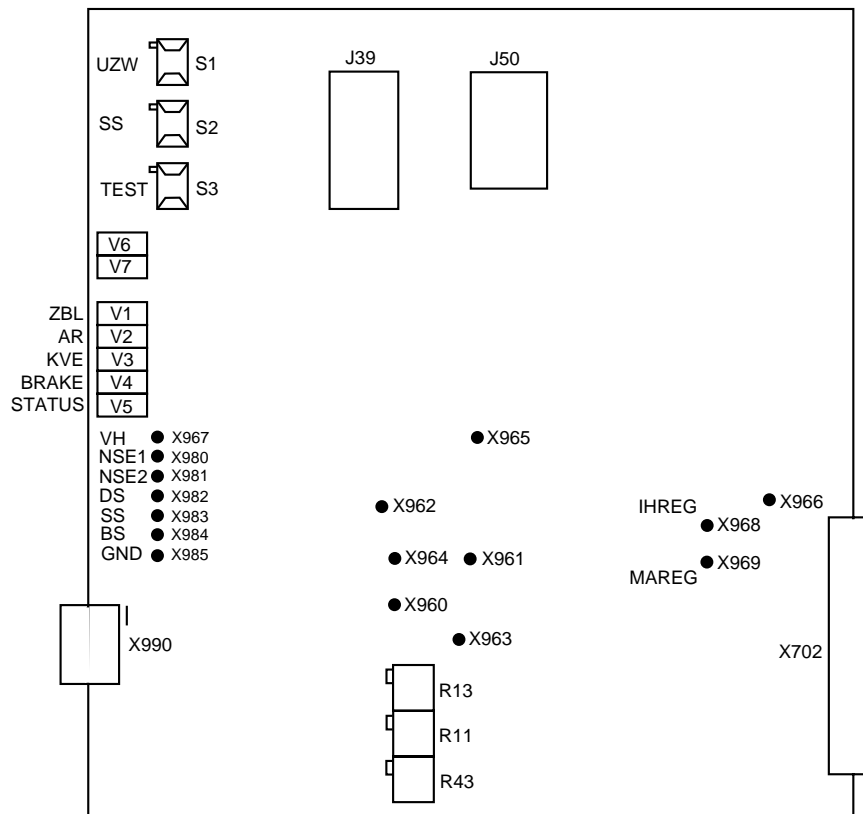
**NOTE!**

*Before mounting the carbon-fibre plate, make sure that the grid (11) is properly positioned on the support.*

## Checks before powering up the generator

On p.c. board D702:

- 1 Set switch S1(UZW) to "OFF" (lower position).
- 2 Set switch S2 (SS) to "OFF" (lower position).
- 3 Set switch S3 (TEST) to "ON" (upper position- output service PC).



MAM00106

Figure 1 P.C. board D702

## Measuring the line resistance

See Figure 2

- 1 Remove fuses F10 (1) and F20 (2) or, when single-phase supply, fuse F10 (1).
- 2 Connect line resistance meter to fuse holders F10 and F20.
- 3 Mains supply "ON".
- 4 Carry out measurement.
- 5 Mains supply "OFF".

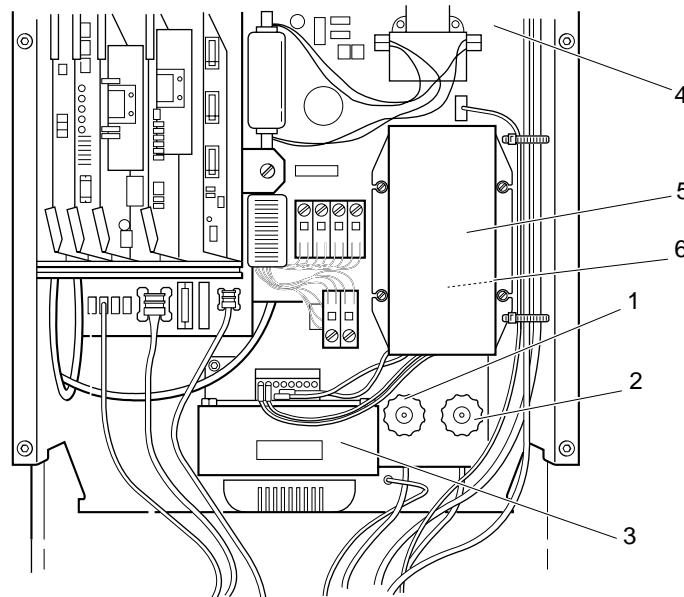
To achieve the full output, the resistance measured must not exceed the following values:

- 0.25 Ohm at 110 V (1-phase)
- 0.45 Ohm at 208 V
- 0.50 Ohm at 230 V
- 0.60 Ohm at 240 V
- 0.65 Ohm at 277 V
- 0.85 Ohm at 400 V (2-phase)

If the above values are exceeded, reduce the generator power in accordance with section 13 in this manual.

## Checking the line voltage in the generator

- 1 If not already done, remove fuses F10 (1) and F20 (2) or, when single-phase supply, fuse F10 (1).



MAM00107

*Figure 2 Line voltage in the generator*

- 2 Mains supply "ON".
- 3 Measure the voltage at fuse holders F10 (1) and F20 (2).
- 4 Check that the mains voltage agrees with the voltage plugged on transformer T10 (3) and p.c. board D711 (4), located above line filter Z1 (5).
- 5 Mains supply "OFF".
- 6 Reinsert fuses F10 (1) and F20 (2).

- 
- 7 Mains supply "ON" (**Do not switch the system on yet**).
  - 8 Measure the voltage at transformer T1 (6) terminals 1 and 3, transformer T1 is located under the line filter Z1 (5). There must be 195 V- 253 V between the terminals.
  - 9 Measure the voltage at the output of line filter Z1 it must lie within 195 V- 264 V.

## Checking the supply voltages

The correct supply voltages +5 V, +15 V and +24 V have already been tested in the factory. Only a visual check of the function is therefore needed.

- 1 System "ON".
- 2 Check that the following orange diodes are "ON" on p.c. board D704:
  - V39 (+15 V)
  - V38 (-15 V)
  - V41 (+5 V)
  - V40 (+24 V)

*This page intentionally left blank.*

## Attaching the swivel-arm covers

### Arranging the swivel-arm system

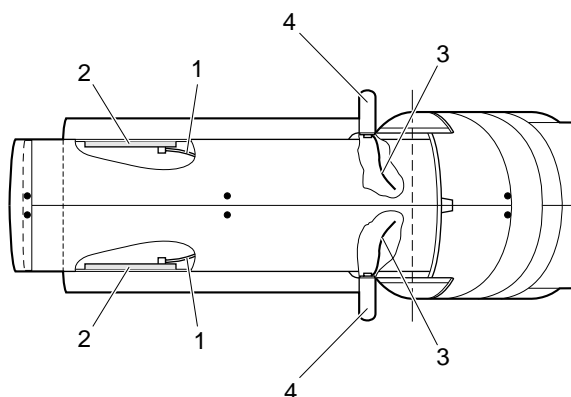
- 1 Install object table, no compression force (swivel-arm system still upside down).
- 2 Rotate the swivel-arm system to 0 degrees by pressing one of the switches for clockwise rotation on the supporting arm.

#### **CAUTION!**

*Do not perform any vertical adjustment of the swivel-arm system, before the protective strips have been removed from the metal curtain*

- 3 System and mains "OFF".
- 4 Remove the swivel-arm system transport safeguard, see section 3.

### Connecting the cables to control-button board and patient handles



*Figure 1 Connecting the cables*

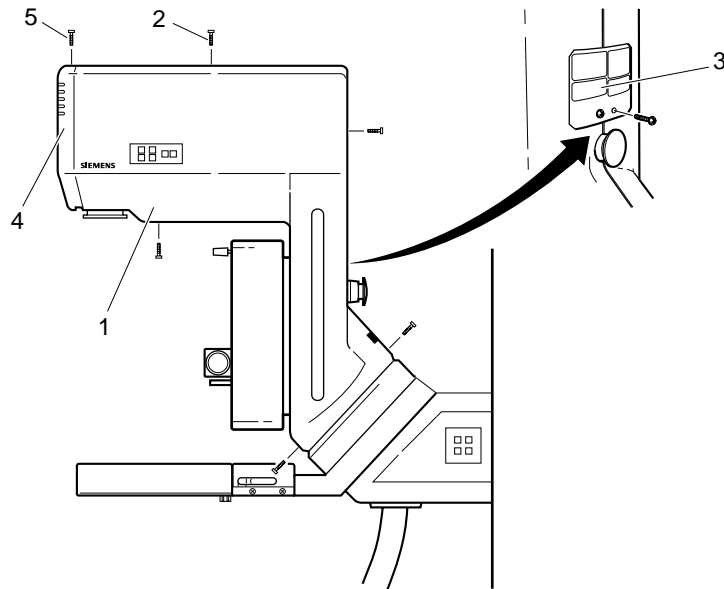
Before installing side covers, cables are to be connected.

- 1 Connect cables X807 (1) to control-button circuit boards D807 (2).
- 2 Connect ground wires to patient handles (3).



## Attaching the covers

Screws in different size are included in the delivery.



MAM00109

*Figure 2 Covers and sign*

- 1 Mount the side covers (1) with six screws (2) on each side.

**NOTE!**

*Don't forget to fit the sign (3) when mounting the side covers. Use the two longer screws.*

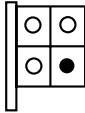
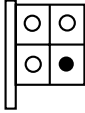
- 2 Mount the front cover (4) over the side covers by engaging the bottom end first, and fasten with two short screws (5).

## Microprocessors

The following LED displays on the processor p.c. boards indicate whether the relevant microprocessors are operating correctly.

### 1 Mains and system "ON".

Following conditions must be indicated after not more than 15 s.

Microprocessors for:	LED displays
Master: P.c. board D702	 <ul style="list-style-type: none"> <li>○ Must be off.</li> <li>● Flashing rapidly.</li> </ul>
IONTOMAT PM: P.c. board D701	 <ul style="list-style-type: none"> <li>○ Must be off.</li> <li>● Must be flashing (2-3 Hz).</li> </ul>

MAM00110

P.C. board D711:

- V9 "ON" (line voltage on).
- V13 "OFF" (system stand-by).
- V11 "ON" (system on).
- V16 "ON" (intermediate circuit - filament).

*This page intentionally left blank.*

---

## Checks without high voltage

- 1 System "OFF".
- 2 On p.c. board D702 set switch S1 (UZW) to "ON" (upper position) and switch S2 (SS) to "OFF" (lower position).
- 3 System "ON".
- 4 Press the exposure buttons on the control panel. The rotating anode shall start up. At the end of the limit time, the rotating anode is braked.
- 5 Release the exposure buttons.

*NOTE!* —————

*If the exposure buttons are prematurely released, "Limit" will be indicated.*

---

- 6 System "OFF".

*This page intentionally left blank.*



## Preparation

This section describes how to check:

- Radiographic voltage.
- Tube current.
- mAs values.

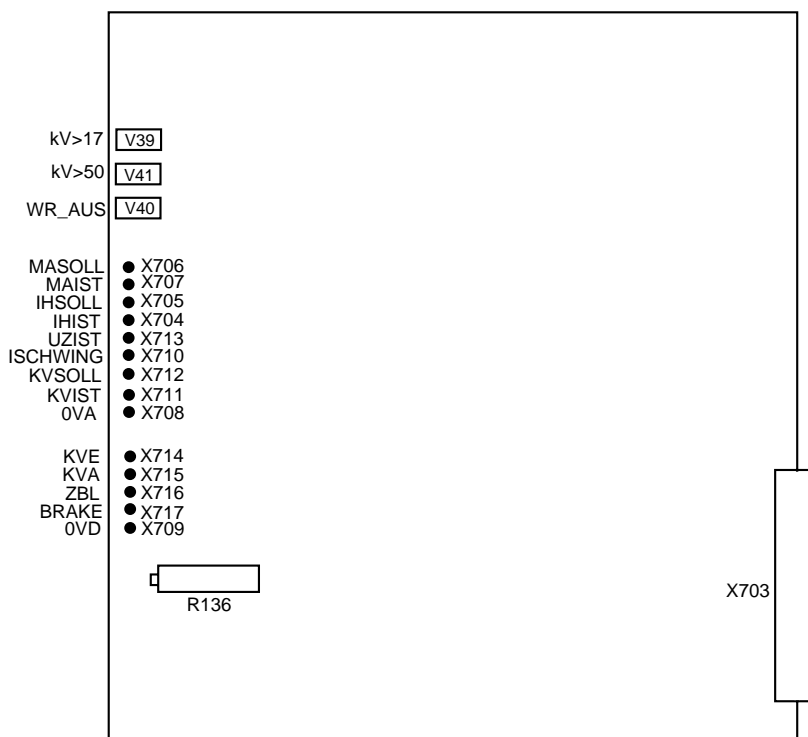
**CAUTION!**

Radiation



**NOTE!**

*Check that the high-voltage plug is plugged into H1 and locked.*



MAM00111

*Figure 1 P.C. board D705*

- 1 Set the switch S2 (SS) to "ON" (upper position) on p.c. board D702.
- 2 Remove the jumper and connect the mAs meter to mAs measuring sockets X3 and X4 on p.c. board D710.



- 3 Connect oscilloscope to p.c. board D705 as follows:
  - Channel 1 to measuring point "KVIST<sub>(actual value)</sub>" (1 V= 5 kV).
  - Channel 2 to measuring point "MAIST<sub>(actual value)</sub>" (1 V= 40 mA).
  - Trigger at measuring point "KVE" (start with high voltage "ON"), rising edge.
  - Twist the measuring leads and connect their grounding braids to measuring point "0VA".
- 4 Connect service PC to circuit board D702 using the connection cable.

*NOTE!*

*Switch S3 on circuit board D702 must be set to upper position.*

- 5 Start service program, see section 21 "Appendix".

## Checking X-ray tube high voltage, tube current and mAs values

- 1 System "ON".
- 2 Set the "cassette loaded" switch to "0" with the service PC program: **Stand configuration - Stand installation - Cassette loaded check** (0=function deactivated).
- 3 Trigger test exposures with the following exposure values and check the kV values and tube current characteristic on the oscilloscope (see oscillograms).
 

The accuracy of the kV is +/- 5% plus +/- 1.5 kV during the first 5 ms of the exposure.

For mA values < 50 mA, the accuracy of the kV is +/- 5% plus +/- 2 kV during the first 5 ms.

The tube current must rise quickly to set value at the beginning of the exposure and run linearly during the exposure, however not when TCR is running.

The accuracy of the mAs product must be +/- 10%.
- 4 Replace the jumper previously removed.

## Tube current reduction

*NOTE!*

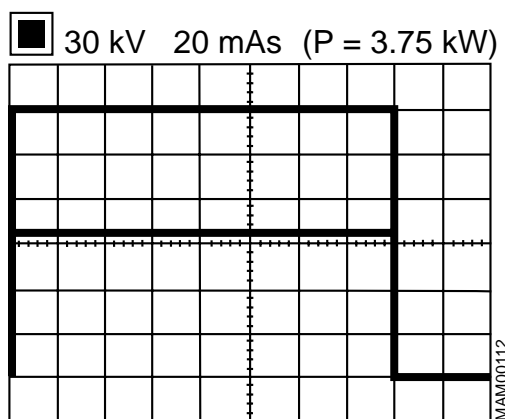
*In MAMMOMAT 300, the tube current reduction is factory set to "ON" (see section 13 and test certificate). In this way, the tube current is reduced to approximately 50 mA at the start of the exposure during the time programmed in section 13.*



## Oscilloscope diagrams

- MAMMOMAT 300 in mAs mode, see *Figure 2-Figure 5*.
- MAMMOMAT 300 with tube current reduction switched on, Iontomat mode with Bucky, see *Figure 6*.
- MAMMOMAT 300 in Iontomat mode with tube current reduction switched off, see *Figure 7*.

### Tube P49 Mo, molybdenum anode 0.3



*Figure 2*

30 kV 1 V/T (1 V = 5 kV)

125 mA 1 V/T (1 V = 40 mA)

20 ms/T

**NOTE!**

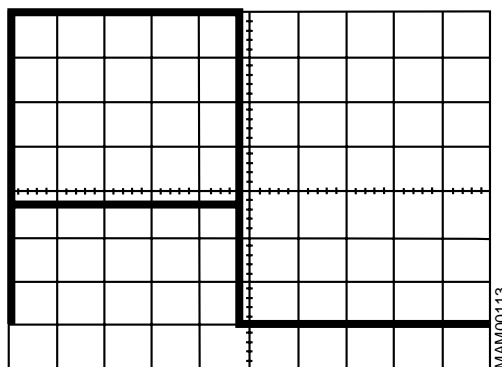
Record the measured kV and mAs value in the measuring protocol page 21-3.





**Tube P49 Mo,  
molybdenum anode 0.3**

■ 35 kV 100 mAs (P = 3.75 kW)



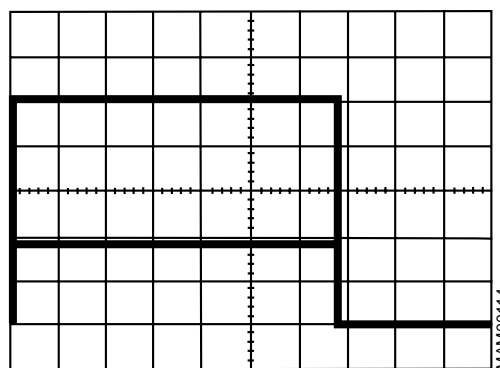
*Figure 3*

35 kV 2 V/T (1 V = 10 kV)

107 mA 1 V/T (1 V = 40 mA)

0.2 sec/T

■ 25 kV 100 mAs (P = 3.75 kW)



*Figure 4*

25 kV 1 V/T (1 V = 5 kV)

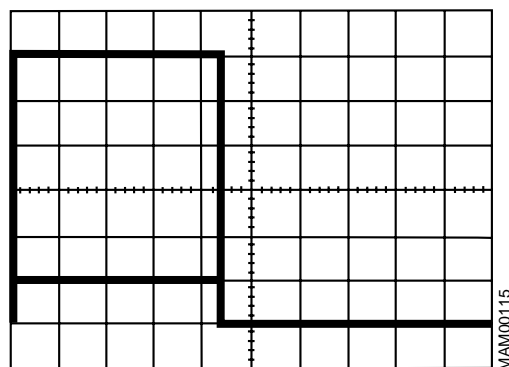
150 mA 2 V/T (1 V = 80 mA)

0.1 sec/T



**Tube P49 Mo,  
molybdenum anode 0.15**

30 kV 10 mAs (P = 0.70 kW) >>



*Figure 5*

30 kV 1 V/T (1 V = 5 kV)

23 mA 0.5 V/T (1 V = 20 mA)

100 ms/T

**NOTE!**

*Small focus is selected by attaching a magnification table.*

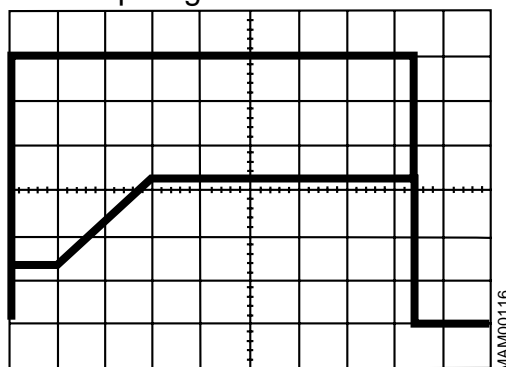
**NOTE!**

*Record the measured kV and mAs value in the measuring protocol page 21-3.*



### Tube P49 Mo, molybdenum anode 0.3

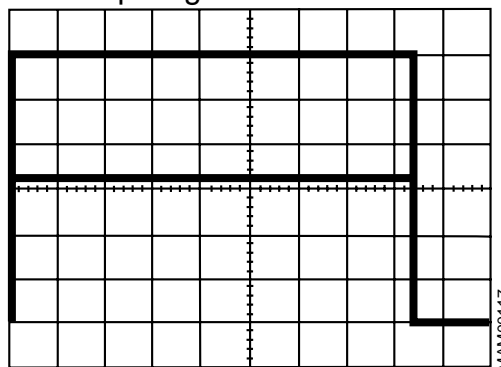
■ 30 kV Iontomat w. grid (P = 3.75 kW)  
40 mm plexiglass



*Figure 6*

30 kV      1 V/T (1 V = 10 kV)  
125 mA    1 V/T (1 V = 40 mA)  
100 ms/T   (total exposure time depending  
              on programmed sensitivity.)

■ 30 kV Iontomat (P = 3.75 kW) >>  
40 mm plexiglass



*Figure 7*

30 kV      1 V/T (1 V = 5 kV)  
125 mA    1 V/T (1 V = 40 mA)  
100 ms/T   (total exposure time depending  
              on programmed sensitivity.)

## Checking and programming with the service PC

Use the service PC to check and program the IONTOMAT. Operation of the service PC is described in section 21.

The tables are optimized for the following four film/screen combinations. Curve x1 is used for magnification tables and curve x2 for other object tables (with or without grid).

Table 1

Film	Screen	Cassette	Sensitivity	Correction curve	
				Magnification	Non-magnification
Kodak Min-RE	Kodak Min-R	Kodak Min-R2	11	A1	A2
Fuji UM-MA HC	Fuji HR Mammo Fine	Fuji EC-MA	9	B1	B2
Agfa Mamoray MR6	Agfa MR Detail S	Agfa MR Detail S	6.5	C1	C2
Dupont Microvision C	Dupont Quantavision ME	Dupont Quantavision	12	D1	D2

MAM00129

Program the IONTOMAT values as follows:

### Sensitivity

Start with the sensitivity listed in the table for channel B, both H ( ) and D ( ), see also M300 Service Instructions. If the film/screen combination used by the customer is not listed in table 1, start with sensitivity 11.

#### NOTE!

*Be sure to use the same type of cassette, screen and film in each object table as the customer uses.*

Indicates the sensitivity for the IONTOMAT channel for contact exposure tables (H) and magnification tables (D).

Values from 0 to 31 can be entered.

Channel A is not used, the sensitivity is therefore set 0.

## Sensitivity correction

Program "Sensitivity correction" to 0 for "without grid" and 0 for "magnification".

IONTOMAT PM - Sens. correction	
	24 x 30
Without grid	_.0
With grid	.0
Magnification	.0
Valid entries from -8 to 8 in 1/2 E.P. For pos entries 1 st digit is < space >, for neg entries type < - >. Input of decimal point not required!	
1 <b>Help</b> 2 <b>Save</b> 3 <input type="text"/> 4 <input type="text"/> 5 <input type="text"/> 6 <input type="text"/> 7 <input type="text"/> 8 <input type="text"/> 9 <input type="text"/> 10 <b>Quit</b>	

MAM00127

Indicates the sensitivity correction for different types of object tables.

The position "without grid" applies to tables with as well as without grid.

Factory set "0", "0", "0".

Different film-density corrections can be programmed for the different tables with the "Sens-cor" module.

## Correction curve

Program "Correction curve" according to table 1 above (see also M300 Service Instructions). If the customer uses another combination or mixture of those listed in tale 1, please refer to page 12-3.

IONTOMAT PM - Correction curve	
	Curve number
Speed H	A2
Speed D	A1
Press space to change the correction-curve table.	
1 <b>Help</b> 2 <b>Save</b> 3 <input type="text"/> 4 <input type="text"/> 5 <input type="text"/> 6 <input type="text"/> 7 <input type="text"/> 8 <input type="text"/> 9 <input type="text"/> 10 <b>Quit</b>	

MAM00128

Indicates which correction curve shall be used for contact exposure tables  (H) and magnification tables  (D). Values shown as delivered.

---

## Other film/screen combinations

In case the customer uses another film/screen combination than those the correction curves are optimized for, see table 1 of correction curves on page 12-1, proceed as follows:

- 1 Begin with curve C2 and make test exposures using a grid table at 25 kV, 2 and 6 cm plexi (5 cm if limit (ER550) or ER 013 occurs, due to insufficient dose rate). If the image from 6 cm plexi (O.D.-6 cm) is lighter than one from 2 cm plexi (O.D.-2 cm), choose correction curve A2 or B2 (A2 makes images from thick objects darker than B2 does, i.e. A2 corrects more than B2). On the other hand, if O.D.-6 cm is darker than O.D.-2 cm, choose curve D2. Repeat the test with the chosen curve. The difference between O.D.-6 cm and O.D.-2 cm ( $\Delta$  O.D.) should be less than 0.30 O.D.
- 2 Now test 27 kV, 2 and 6 cm. Try even 30 and 35 kV if these kV's are of interest for the customer. If this  $\Delta$  O.D. is  $\leq 0.30$  O.D., go to 3. If not, it is necessary to test another curve (choose between A2, B2, C2 and D2) at 27 kV. Choose the best one and repeat the test at 25 kV. Continue in this manner until the result is as good as possible for the kV's of interest for the customer. Diagrams 1, 3, 5 and 7 on the following pages can be of help. Note that the steeper the curve is, the more the thicker objects are corrected (they will be darker).
- 3 Check also the correction with 2 cm plexi between the different kV values of interest. If this  $\Delta$  O.D. is  $\leq 0.30$  O.D., an acceptable curve has been chosen. It may not be possible to reach the specified O.D. corrections, choose then the best compromise for the customer's needs.
- 4 Do the same tests with magnification table, but use 2 and 5 cm plexi instead. The permissible  $\Delta$  O.D. for magnification tables is  $\leq 0.40$  O.D. Choose between correction curves A1, B1, C1 and D1. Diagrams 2, 4, 6, and 8 on the following pages can be of help.

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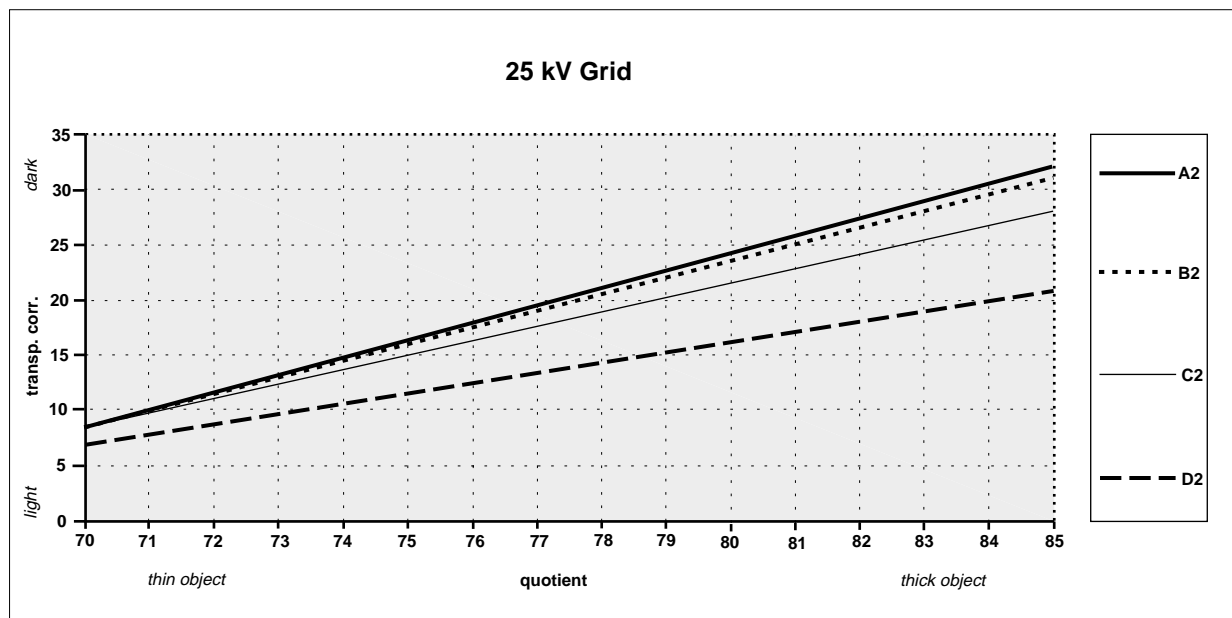
### NOTE!

*When necessary, curve A2, B2, C2 and D2 can be used for magnification tables and/or A1, B1, C1 and D1 for grid tables. In general, the X1-curves (magnification) correct more than the X2-curves.*

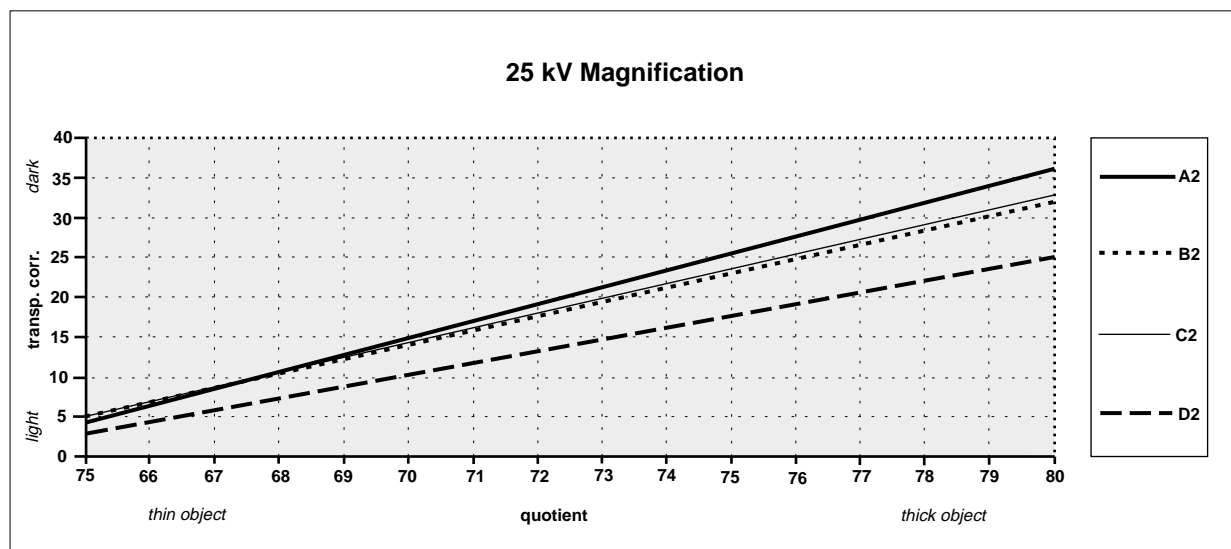
---

## Correction curve diagrams

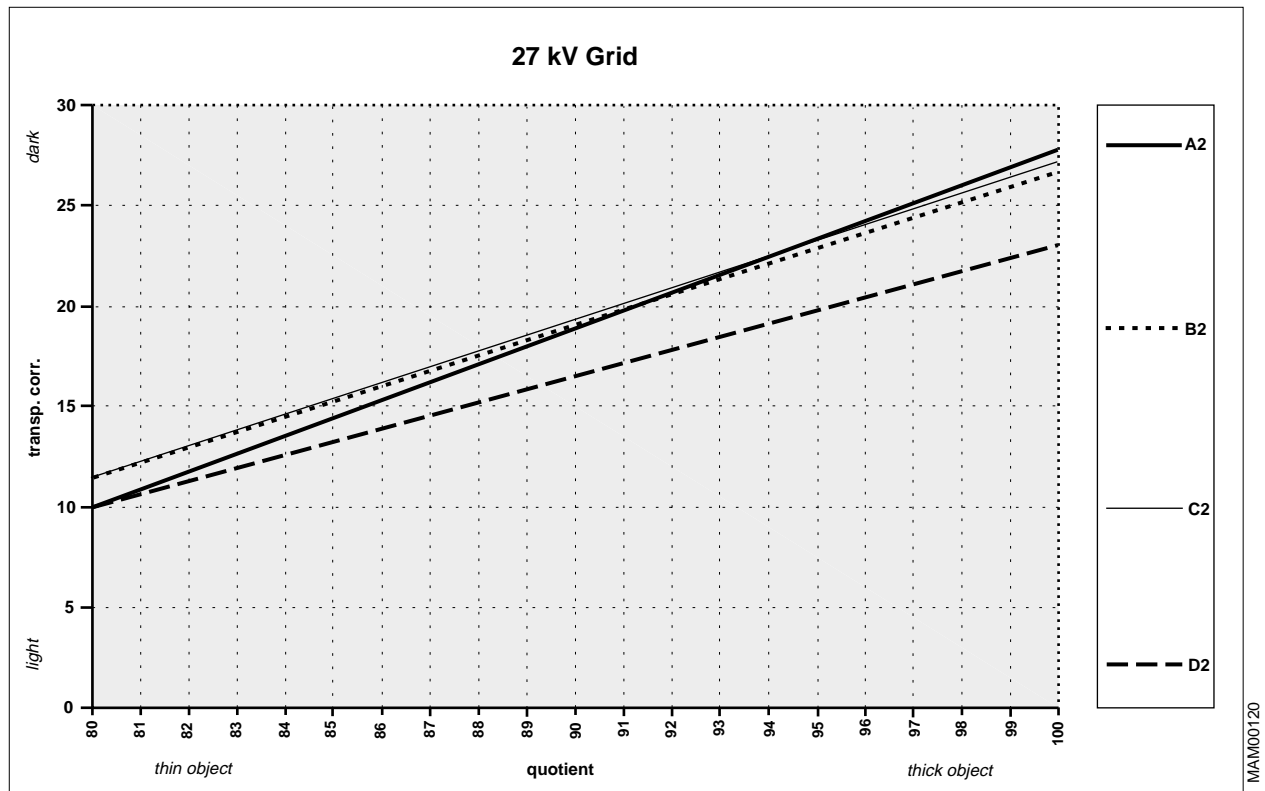
The following diagrams approximately show the families of correction curves. The axes "Quotient" and "Transparency correction" are the values shown in "Normal mode, Iontomat data" with the service program.



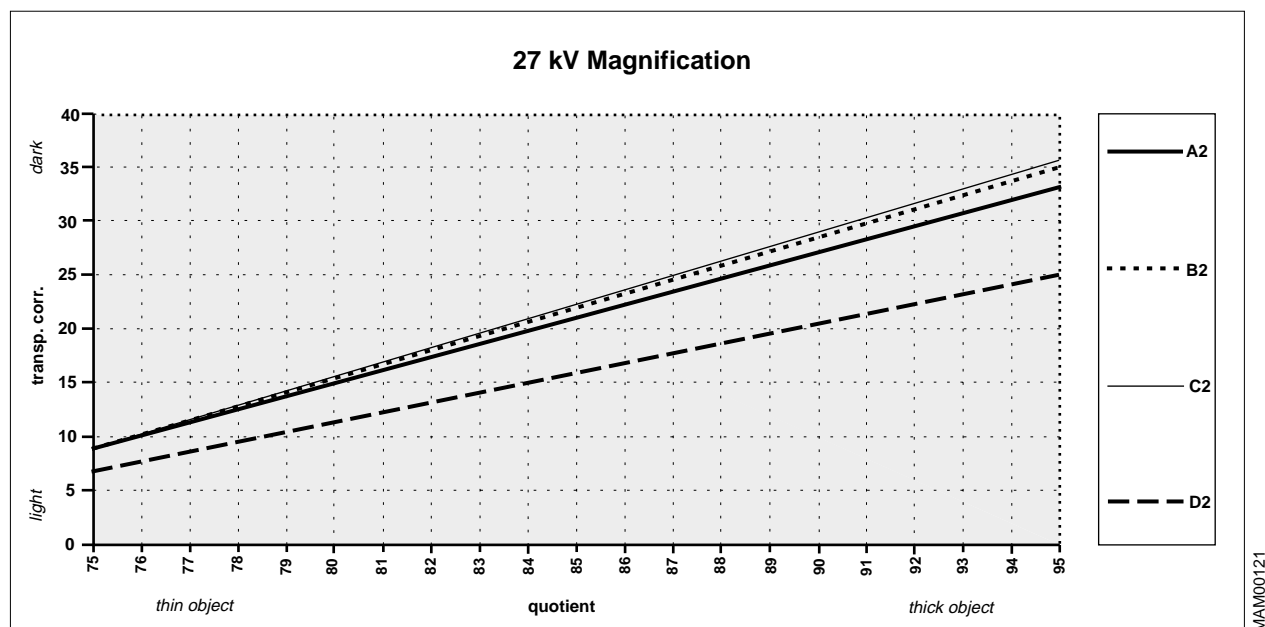
**Diagram 1**



**Diagram 2**



**Diagram 3**



**Diagram 4**



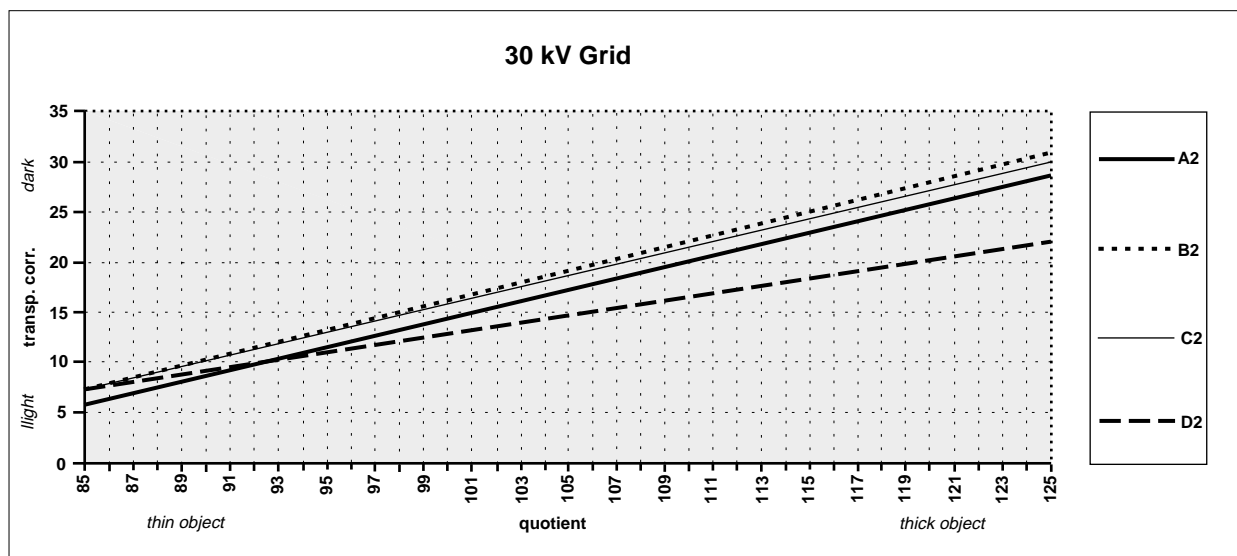


Diagram 5

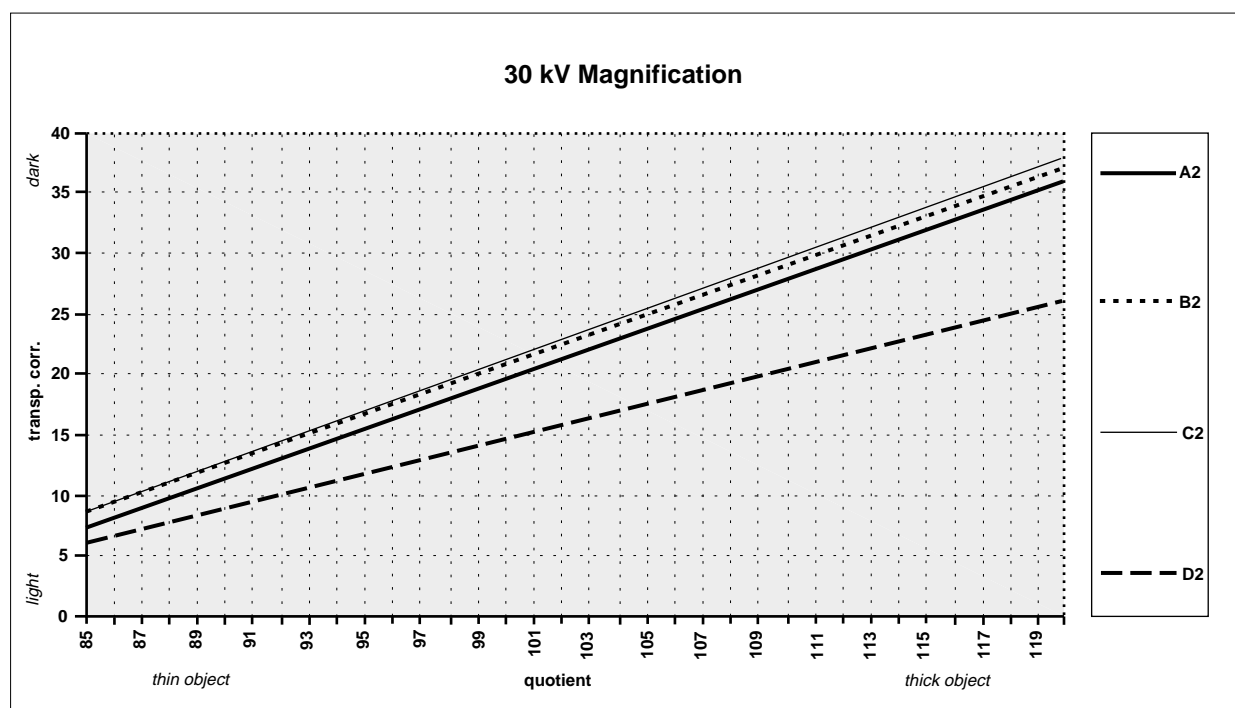


Diagram 6

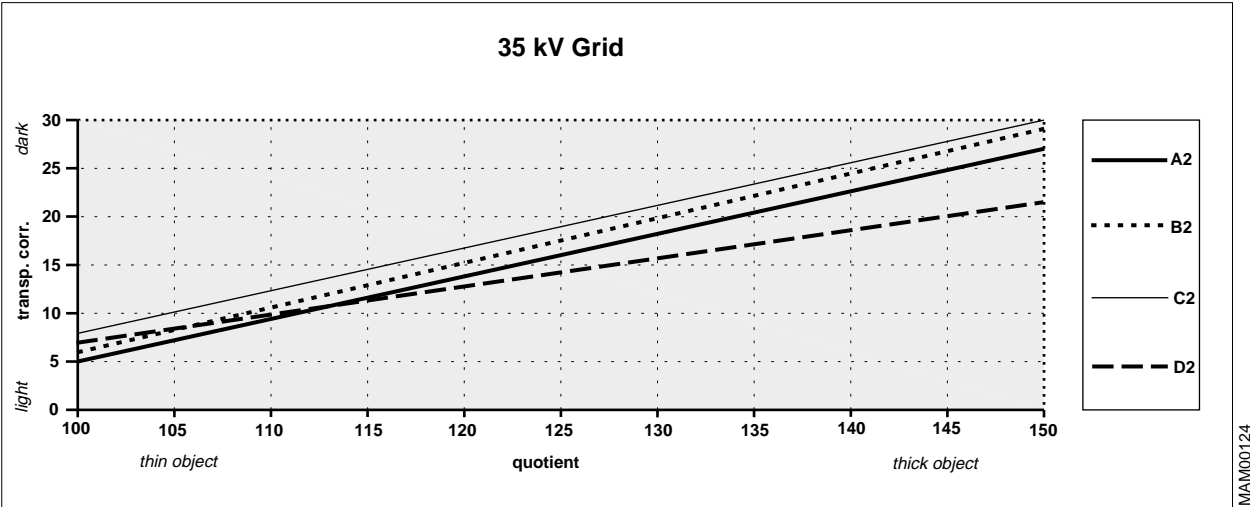


Diagram 7

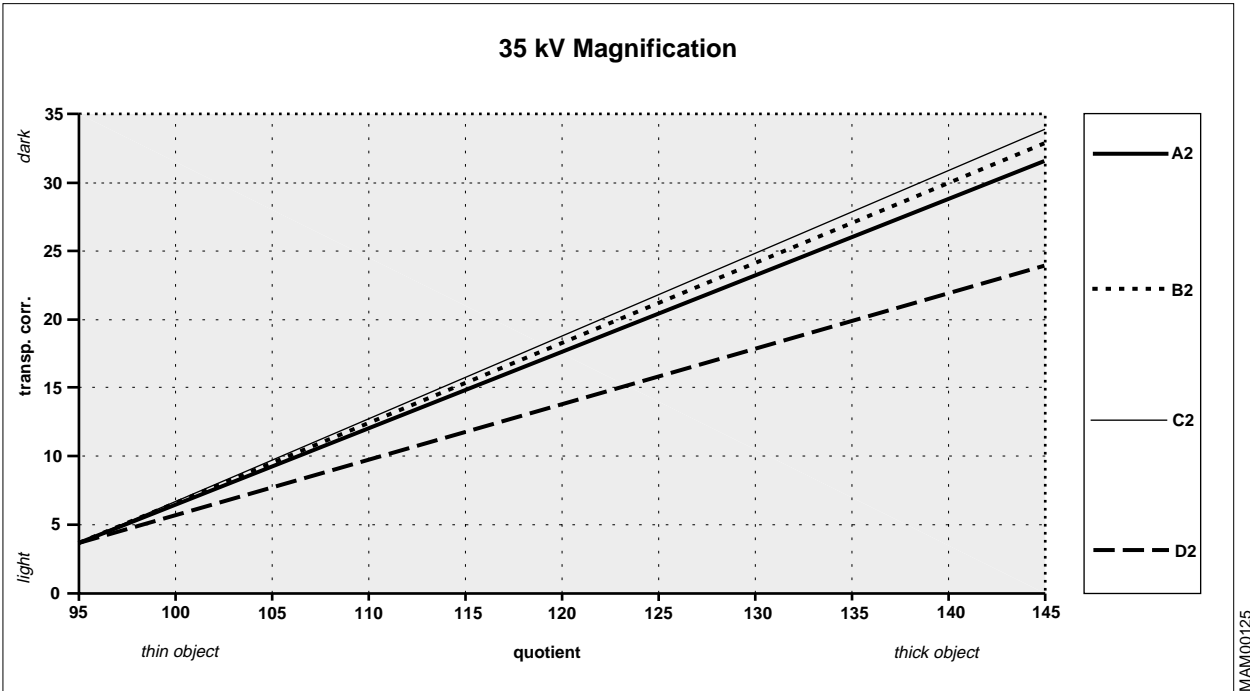


Diagram 8

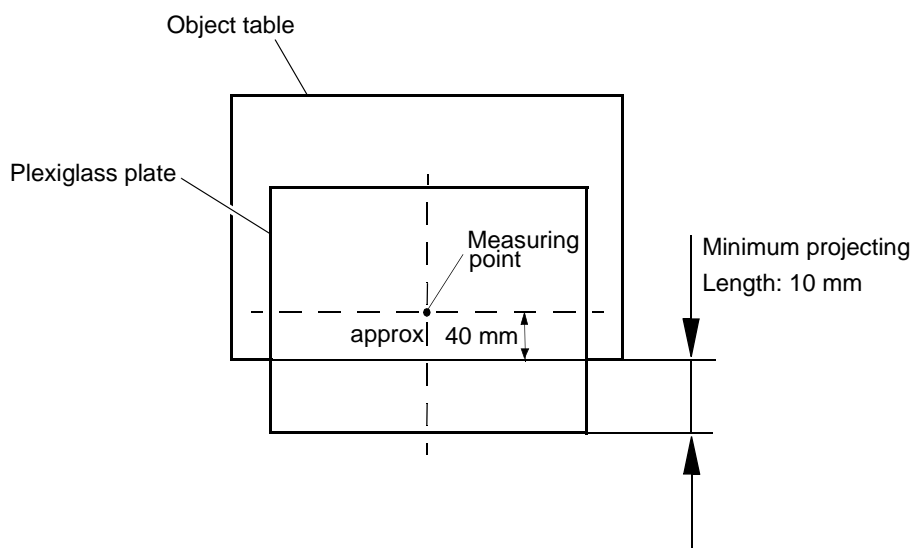
## Checking the film density

The sensitivity to be programmed must be determined by means of test exposures at 25 kV, or kV preferred by the customer, and 20 mm plexiglass.

The plexi must extend at least 30 mm behind the rear edge of the detector marking on the compression plate and 10 mm beyond the chest wall edge of the table.



The detector shall be nearest the chest wall.

When making test exposures, ensure correct positioning of the plexiglass plates.



### NOTE!

*Detector nearest chest wall. Place the plexi plates in the same position for all exposures and measure the density as shown above on the emulsion side of the film.*

Button D () should be used for magnification tables and button H () for other object tables (with or without grid).

Start with the sensitivity listed in table 1 and adjust a density of approx. 1.5 for non-magnification tables ("Sensitivity H").

Change to magnification table, if used, and program "Sensitivity D" for the density as above.

The final values are dependent on the type of cassette used and desired optical density.

---

## Checking the automatic transparency adaption

Check the automatic transparency adaption with a grid table with 20, 40 and 60 mm plexi at the voltage(s) preferred by the customer (within 25-35 kV). If the dose rate is too low (error 013 or "Limit"), use 50 mm plexi instead of 60 mm.

Tolerance:

$\leq 0.3$  density difference at constant voltage and thickness 20-60 mm.

$\leq 0.3$  at constant thickness and 25-35 kV.

*NOTE!*

---

*Tolerance valid for grid tables and film/screen combination according to table 1.*

---

These limits apply for film with max. gamma 4.0 measured at the density chosen.

*NOTE!*

---

*The film density levels may vary from cassette to cassette. Therefore, be sure to use the same cassette for all test exposures.*

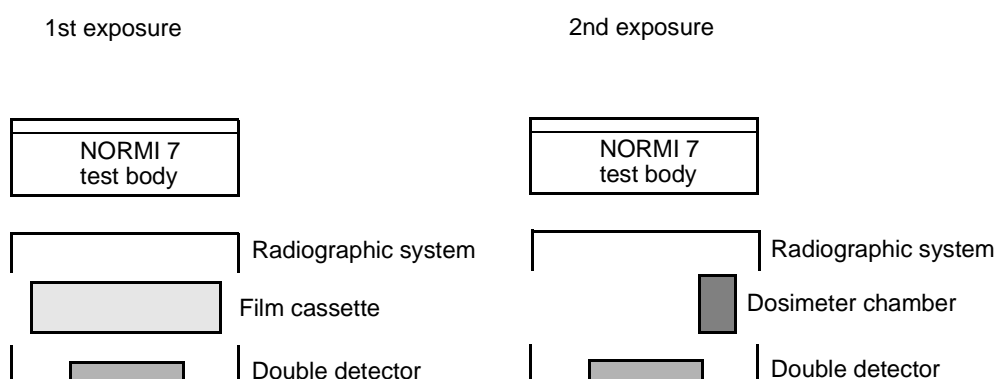
---

## Checking cut-off dose and resolution (§16 Germany)

This test is only required in the Federal Republic of Germany in the area of application of the X-ray decree. The result must be entered in page 9 of the acceptance test certificate supplied. Both tables must be checked.

Ascertain the cut-off dose ( $K_B$ ) and resolution ( $R_g$ ) with the NORMI 7 test body

### Test arrangement (front view)



### Procedure:

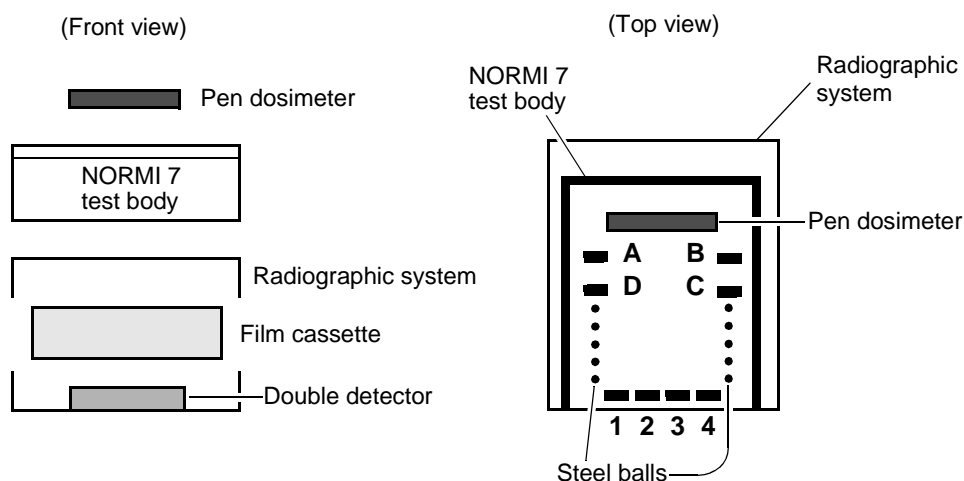
- 1 Select 30 kV and AEC (Iontomat) on the control panel.
- 2 Place the NORMI 7 test body on the object table flush with the chest wall side.
- 3 Slide film cassette into the object table.
- 4 Trigger the first exposure.
- 5 Note the mAs reading ( $Q_{G(1)}$ ) shown on the control panel.
- 6 Develop the film. Measure the resolution ( $R_g$ ) and the density ( $D$ ) and enter in the form.
- 7 Position the dosimeter chamber in the cassette slot.
- 8 Select 250 mAs on the control panel.
- 9 Trigger second exposure.
- 10 Record the dose value ( $K_{B(2)}$ ) measured as well as the associated mAs reading ( $Q_{G(2)}$ )
- 11 Calculate and record the cut-off dose as follows:

$$K_B = K_{B(2)} \cdot \frac{Q_{G(1)}}{Q_{G(2)}}$$

## Output values of constancy testing (§16 Germany)

Determine the output values of the constancy testing at approx. 30 kV with the customer's own constancy test body (NORMI 7 test body etc.) and enter them in the form stapled to the acceptance test certificate.

### Test arrangement



Plexiglass steps:	Woven steel wire:
1 = 40 mm	A = 100 $\mu\text{m}$
2 = 43 mm	B = 80 $\mu\text{m}$
3 = 49 mm	C = 63 $\mu\text{m}$
4 = 46 mm	D = 40 $\mu\text{m}$

### Procedure:

- 1 On the control panel, select a value of approx. 30 kV and AEC.
- 2 Place the test body on the object table flush with the chest wall side.
- 3 Slide film cassette into the object table.
- 4 Trigger the exposure and develop the film.
- 5 Measure the resolution (A-D), density (1-4) and the over-radiation on the chest wall side and enter in the form (steel balls).
- 6 Read off the pen dosimeter and record the dose value.

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---

## Setting the real time clock

### Prerequisite

The correct date and time must be set in the service PC. If not set date at C:\> date and time at C:\> time.

### Setting the time in the mammomat

#### Main menu:

- 1 Select **Configuration** <↑> <↓> <ENTER>.
- 2 Select **Clock** <↑> <↓> <ENTER>.
- 3 Press <F2>.

With <F2> the date and time set in the service PC are taken over by the Mammomat.

## Setting the tube-current reduction

In Mammomat 300, the tube-current reduction is factory-set to "ON", which means that the tube current is reduced to approx. 50 mA during the first 100 ms of the exposure. In this way, possible grid lines are avoided.

If the tube-current reduction is set to "OFF", grid lines may occur at short exposure times (< 100 ms).

---

#### NOTE!

*The tube-current reduction is effective only in Iontomat mode.*

---

#### Main menu

- 1 Select **Configuration** <↑> <↓> <ENTER>.
- 2 Select **Miscellaneous** <↑> <↓> <ENTER>.
- 3 Select **Tube mA red.** <↑> <↓> <ENTER>.  
Tube-current reduction (TCR) at short exposure times.  
TCR switch is ON/OFF.  
Exposure time with 50 mA tube current is 100 ms.
- 4 Switch **ON** or **OFF** with <↓>.
- 5 Save the programmed values with <F2>.



## Reducing the generator power

To achieve full power, the measured resistance must not exceed the following values:

- 0.25 Ohm at 110 V (1-phase)
- 0.45 Ohm at 208 V
- 0.50 Ohm at 230 V
- 0.60 Ohm at 240 V
- 0.65 Ohm at 277 V
- 0.85 Ohm at 400 V (2-phase)

If the above values are exceeded, reduce the generator power as follows:

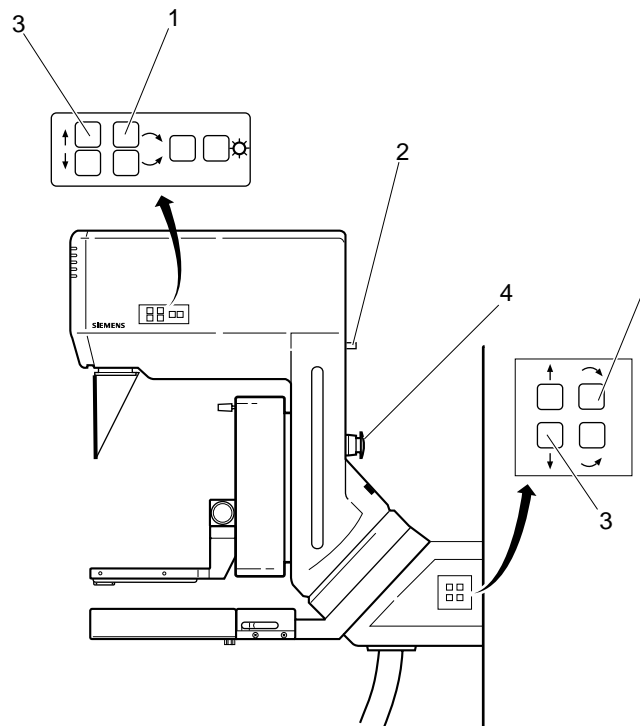
### Main menu

- 1 Select **Configuration** <↑> <↓> < ENTER>.
- 2 Select **Miscellaneous** <↑> <↓> < ENTER>.
- 3 Select **Red. of power** <↑> <↓> < ENTER>.  
Reduction of power depending on line quality.  
Tube is P 49 Mo 03.
- 4 Select nominal line voltage \_\_\_\_ V with cursor keys <↑> <↓> and < ENTER>.
- 5 Type in line impedance \_\_\_\_ Ω. Enter the measured line impedance.  
Calculated power is \_\_\_\_ kW. Max. possible tube power is displayed.
- 6 Save the programmed values with <F2>.

## Rotary motion

- 1 System "OFF".

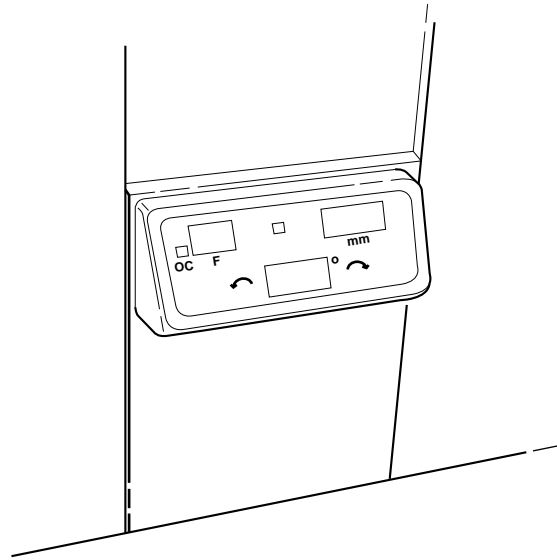
The rotary motion and the vertical adjustment of the swivel-arm system shall be blocked.



MAM00140

*Figure 1 Swivel-arm system*

- 2 System "ON", object table installed and set projection angle to minimum with presetting knob (2).
- 3 Check the rotary motion of the swivel-arm system by pressing buttons (1) one by one. The rotation of the swivel-arm system shall stop when the button is released or when end position is reached (+135 degrees clockwise and -180 degrees counter-clockwise). The projection angle is shown on the display at the lower part of the stand.



MAM00145

*Figure 2 Display at the lower part of the stand*

- 4 Set the projection angle to 60 degrees with presetting knob (2).  
The preset angle is displayed for approx. 3 sec.
- 5 Press one of buttons (1).  
The rotary motion of the swivel-arm system shall stop automatically when the preset projection angle (both + and -) is reached and at 0 degrees.

**NOTE!**

*All eight rotary motion buttons (four on either side) must be checked. After the button has been released, the swivel-arm system shall remain in the position set.*

## Vertical adjustment

**CAUTION!**

*Before vertical adjustment of the swivel-arm system is performed, be sure to remove the protective strips from the metal curtain, see page 3-4.*

*See Figure 1*

- 1 Press buttons for upward and downward movement (3) of the swivel-arm system.  
The movement shall stop automatically when either end position is reached or when the buttons are released.

**NOTE!**

*All eight vertical adjustments buttons (four on either side) must be checked. The switching off in upper and lower end position is effected by switches S881 and S884 respectively.*

---

## Emergency stop

*See Figure 1*

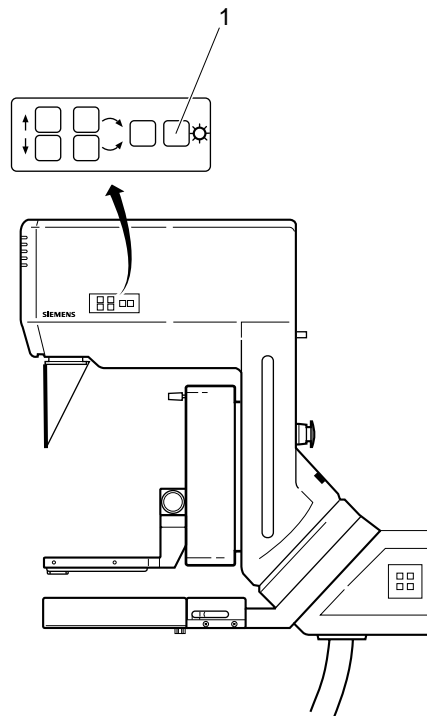
- 1 Press the emergency stop button (4).

The button shall latch and all motorized movements of the equipment shall be blocked ("Er 824" shall appear). To reset the emergency-stop button, turn it clockwise.

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## Checking and adjusting the field light time

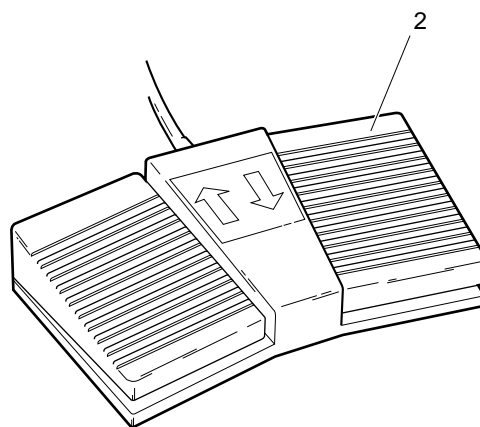
### Checking the field light time



MAM00141

*Figure 1 Tube head*

- 1 Switch on the field light by pressing switch (1) or by pressing the compression foot switch (2).  
The field light shall go out automatically after a preset period of time (normally 20 sec.).



MAM00133

*Figure 2 Foot switch*

## Adjusting the field light time

The illumination time of the field light can be adjusted according to the customer's desire within a certain range.

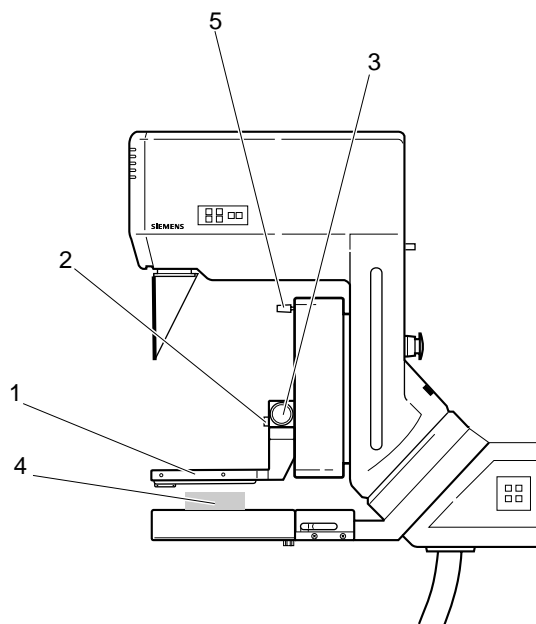
*NOTE!*

*Shorter illumination time means increased life time of the lamp.*

---

- 1 Connect the service PC to the generator and start the program as described in section 21.
- 2 Program according to the following:  
Main menu
  - 1 Select **Stand configuration** <↑> <↓> <ENTER>.
  - 2 Select **Stand installation** <↑> <↓> <ENTER>.
  - 3 Type in illumination time and save with <F2>.

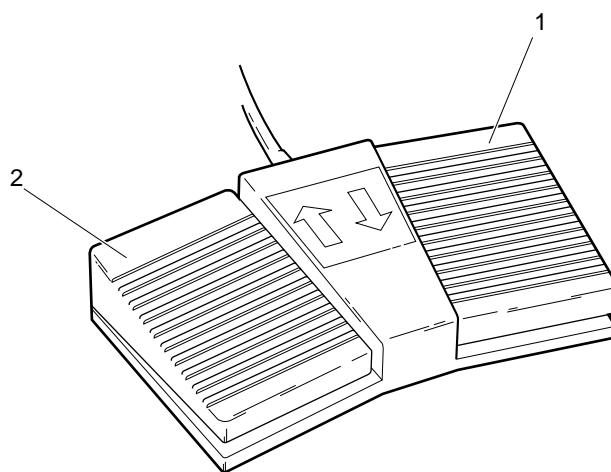
## Checking the compression device



MAM00142

*Figure 1 Swivel arm system*

- 1 Attach compression plate (1) if it is not already done.
- 2 Check that the compression plate can not be removed without pressing the compression plate release button (2).
- 3 Check the function of the knobs for manual compression/decompression (3).
- 4 Place a piece of soft material on the object table, for example a rolled up towel or a piece of foam-rubber (4).
- 5 Check the function of the foot switch for motorized compression/decompression (1) and (2) in *Figure 2*.



MAM00132

*Figure 2 Foot switch*



## 16-2 Checking the compression device and OPCOMP

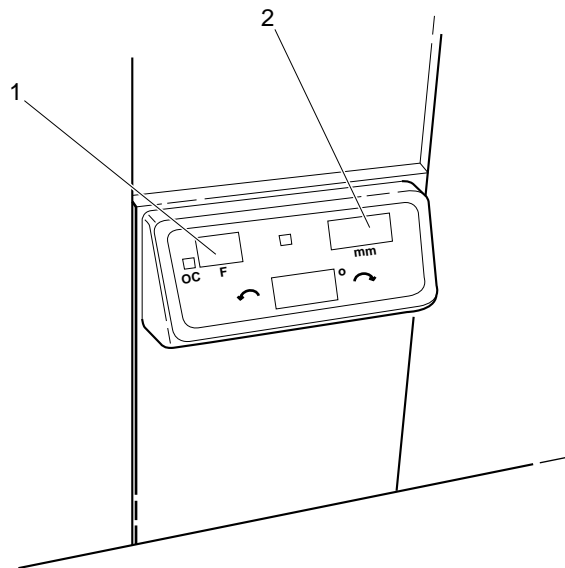
---

- 6 Press the foot switch for motorized decompression to move the compression plate upwards while at the same time pressing the compression plate in the opposite direction by hand.

The upward movement of the compression plate shall now stop (safety switch).

- 7 Set the compression to 7 kg by using the presetting knob (5) in *Figure 1*.

The preset compression force appears on the display at the lower part of the stand (1) in *Figure 3*.



MAM00134

*Figure 3 Display at the lower part of the stand*

**NOTE!**

*The display (1) switches over to the actual compression-force value, when the compression plate comes in contact with the breast. The compressed thickness is shown on the display (2).*

- 8 Press the foot switch for motorized compression to move the compression plate downwards while simultaneously pressing the compression plate in the opposite direction by hand.

The compression plate shall now slow down and stop, when the preset compression force is reached.

**NOTE!**

*During compression, the motorized vertical adjustment as well as the rotary motion of the swivel-arm system shall be blocked.*

## Checking the OPCOMP (Option)

*See Figure 1*

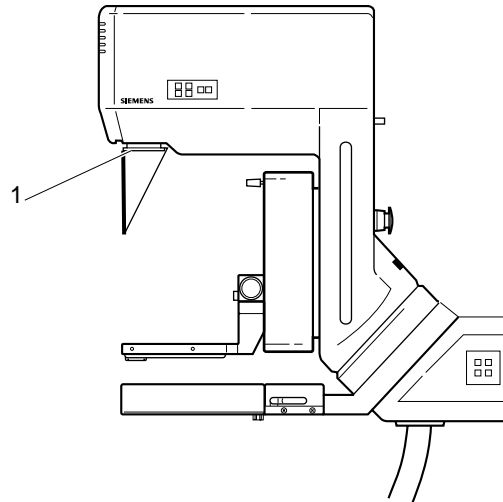
- 1 Decompress.
- 2 Set the compression force to 20 kg by using the presetting knob (5) and compress.  
The compression movement must be interrupted by OPCOMP before 20 kg is reached, i.e. at 5-15 kg depending on the material (4) used.

## 16-4      Checking the compression device and OPCOMP

---

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## Checking the exposure blocking



MAM00143

*Figure 1 Tube head*

- 1 Check that the exposure release is blocked during the following conditions.
  - No film cassette inserted.
  - No object table installed.
  - No external diaphragm (1) used with an magnification table installed.

**NOTE!**

*The "cassette loaded" switch must be set to "ON" with the service PC program: **Stand configuration - Stand installation - Cassette loaded check (1=function activated)**.*

**NOTE!**

*The film cassette must be exchanged after each exposure. A second exposure before exchanging the cassette is not possible (exposure release is blocked).*

*This page intentionally left blank.*

## Checking the radiation field limitation

### General

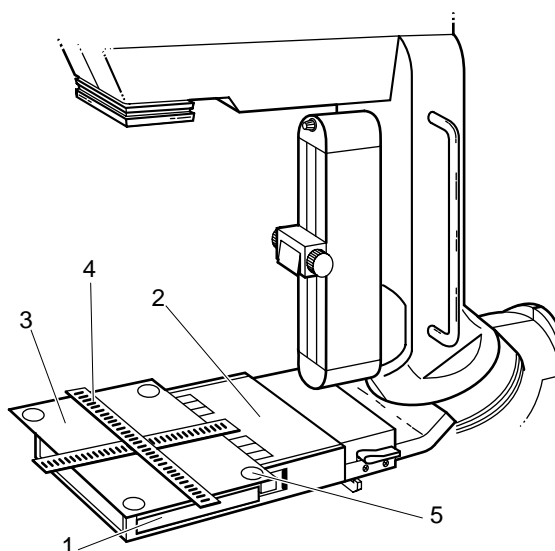
The radiation field must not fall outside the edges of the image receptor, except for the chest-wall side, where an over-radiation of maximum 1.0 % of the SID (= 6.5 mm) is allowed. The light field must coincide with the radiation field.

Maximum tolerance:

$$2 \% \text{ of the SID} \quad | \text{left} | + | \text{right} | \leq 13 \text{ mm}$$

$$| \text{back} | + | \text{front} | \leq 13 \text{ mm}$$

### Measuring procedure



MAM00135

*Figure 1 Checking the radiation field*

- 1 Put film into the cassette (1).
- 2 Insert cassette into the object table (2).
- 3 Place film bag (3) on the object table.  
If no corresponding film bag is available, you can place two film cassettes side by side on the object table.
- 4 Place a lead-cross (4) on the film bag/cassettes.
- 5 Switch on light field and mark the edges of the light field with four coins (5).
- 6 Release exposure.
- 7 Develop exposed films.

## Evaluation

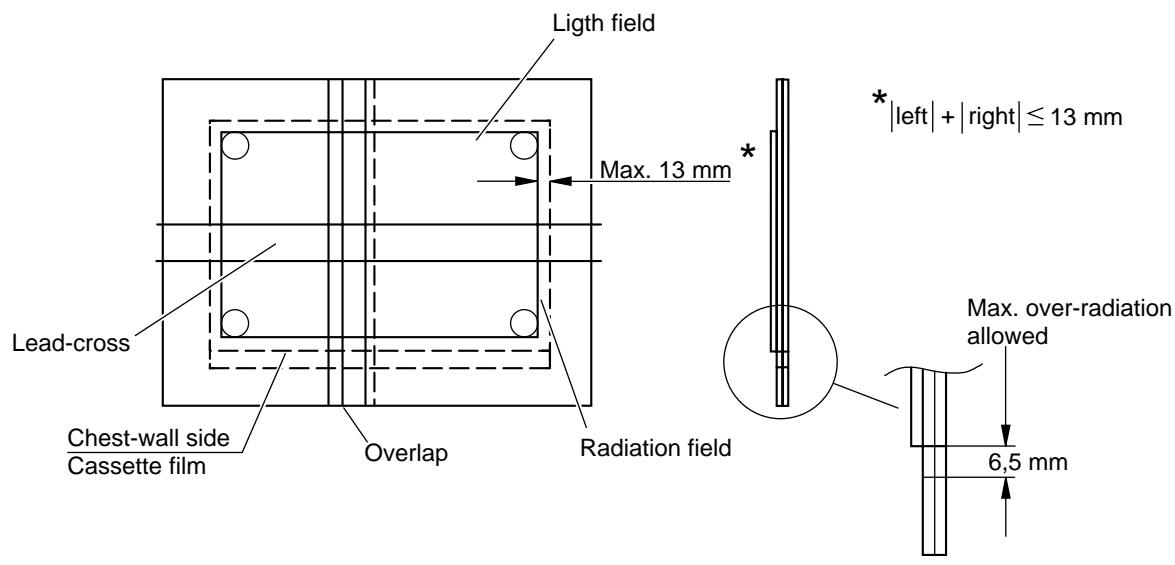


Figure 2 Field limitation

- 1 Place the films over each other according to the position markings.

As shown in *Figure 2*, the film must be completely exposed on the side facing the chest wall. The maximum allowed over-radiation is 6.5 mm (1.0 % of SID).

No over-radiation is allowed on the other three sides.

The maximum divergence between radiation field and light field of 13 mm (2 % of SID) must not be exceeded.

Correction, see Service Instructions.

**Repeat this check with all object tables.**

---

## Service PC and measuring instruments

### Recording the programmed values

Save the programmed values at menu command "SAve config.file".

**Main menu:**

- 1 Select **Configuration** <↑> <↓> < ENTER>.
- 2 Select **SAve config.file** <↑> <↓> < ENTER>.
- 3 Press <F2>.  
Save data with <F2>.

*NOTE!*

*No write protection on the diskette !*

---

### Reading the exposure counter and deleting the error memory

Read the exposure counter and delete the error memory after putting the stand into service.

#### A/ Reading the exposure counter

**Main menu:**

- 1 Select **Service** <↑> <↓> < ENTER>.
- 2 Select **Show exposure counter** <↑> <↓> < ENTER>.
- 3 Enter the current counter reading in the certificate.

#### B/ Deleting the error memory

**Main menu:**

- 1 Select **Service** <↑> <↓> < ENTER>.
- 2 Select **Delete error buffer** <↑> <↓> < ENTER>.
- 3 Delete the error memory with <Y>.
- 4 Leave the program with <F10>.



### Removing the measuring instruments

- 1 Turn OFF the generator.
- 2 Remove the service PC.
- 3 Remove connected measuring instruments.

### Checking the protective grounding resistance

Using the protective ground-wire tester, measure the resistance between the protective ground terminal in the stand (X899, see Section 5) and all metallic parts of the equipment which the patient/operator may come in contact with, incl. all object tables. The protective ground resistance must not exceed  $0.1\Omega$ .

### Mounting the cable duct covers

If it's not already done mount the cable duct covers, see section 4.

## Mounting the stand covers

The Mammomat stand covers exist in two versions, one with separate rear side covers and one with a single rear cover that also covers the rear sides.

**WARNING**

When mounting the stand covers, make sure that the screws at the top of the stand are securely tightened and have functioning contact washers (1). These screws are used to establish protective ground connections. Before mounting the front covers, be sure to remove the protective strips from the metal curtain (2). Store the strips in the holders provided on both sides of the curtain.

### Mammomat stand with separate rear side covers.

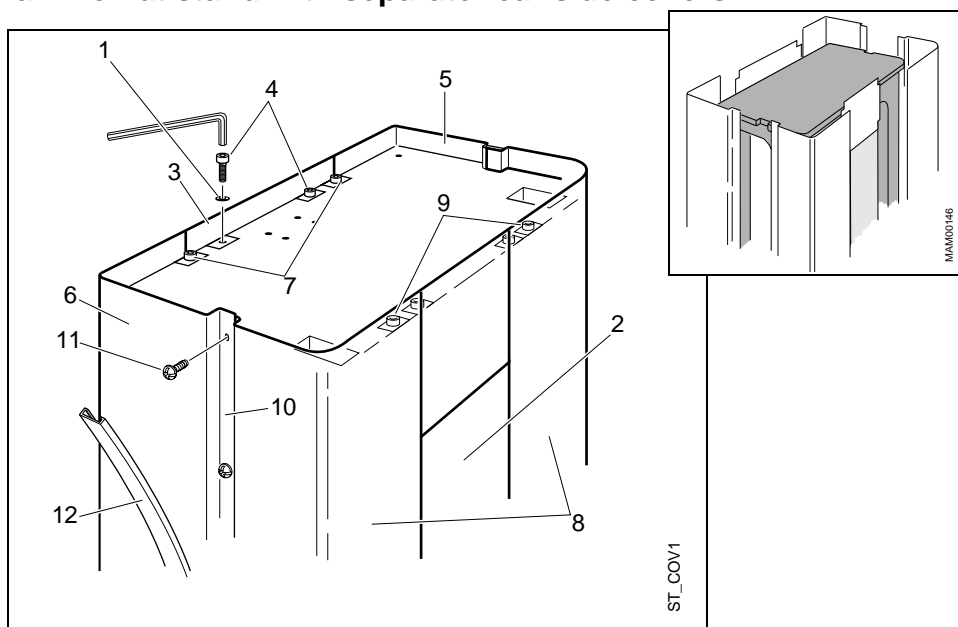
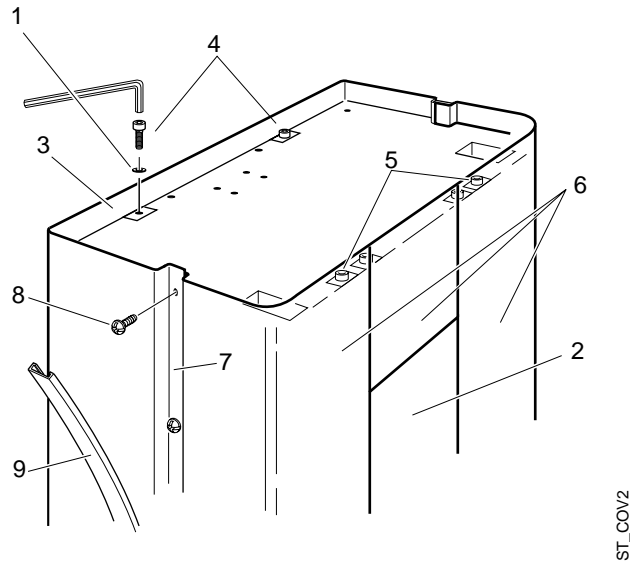


Figure 1 Mounting the stand covers on a stand with separate rear side covers.

1. Fit the rear cover (3) to the stand and fasten it with screws (4) and contact washers (1).  
**Be careful not to damage the cables at the cable outlet!**
2. Fit left and right front covers (8) to the stand and fasten with screws and contact washers (9).
3. Fit left and right rear side covers (5) (6) to the stand and fasten with screws and contact washers (7).
4. Fit inner plastic strip (10) to the front and side covers and fasten with screws (11), eight on either side.
5. Press on the outer plastic strip (12).

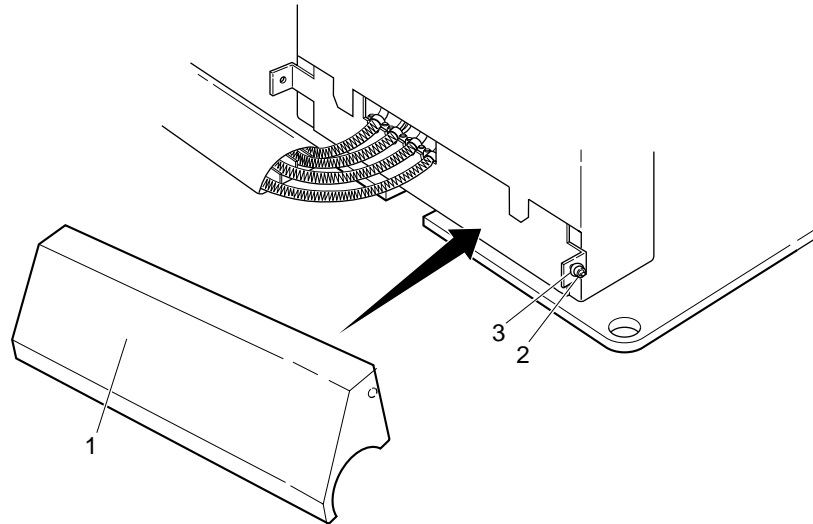
**Mammomat stand with single rear cover.**

*Figure 2 Mounting the stand covers on a stand with single rear cover.*

*The Covers are delivered with a protective plastic film, which shall be removed and discarded.*

1. Fit left, right and middle front covers (6) to the stand and fasten with screws and contact washers (5).
2. Fit the rear cover (3) to the stand and fasten it with screws (4) and contact washers (1).  
**Be careful not to damage the cables at the cable outlet!**
3. Fit inner plastic strip (7) to the front and side covers and fasten with screws (8), eight on either side.
4. Press on the outer plastic strip (9).

## Fitting the cable outlet cover

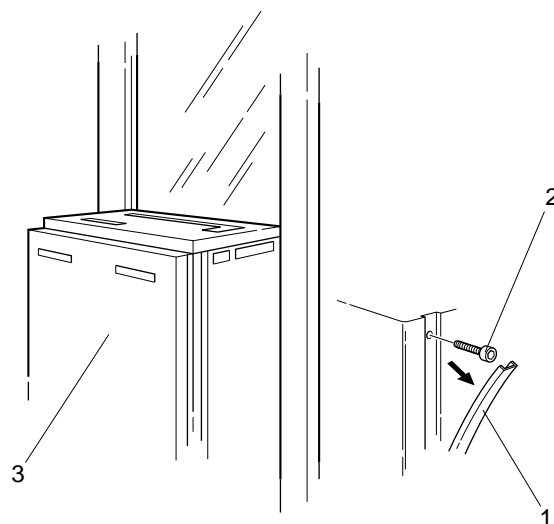


MAM00130

*Figure 3 Cable outlet cover*

- 1 Fit the cable outlet cover (1) to the stand and fasten with screws (2) and contact washers (3).

## Mounting the front cover onto the generator



MAM00131

*Figure 4 Mounting the front cover*

- 1 Fit the front cover (3) to the generator and fasten it with the sixteen screws (2).

---

**WARNING!**

*When attaching the front cover, make sure that all eight contact washers (four on either side) are used again as in the original assembly (under the screws with clearance holes in the plastic strips). The screws must be securely tightened and the washers must be functional. This is necessary to establish protective ground connection.*

---

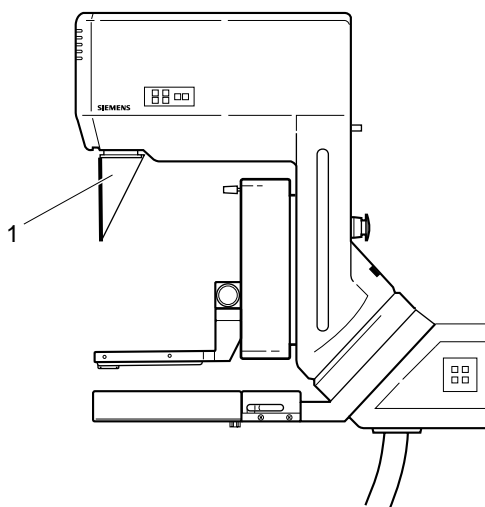
- 2 Press on the outer cover strip (1).

## Final protective grounding resistance test

Using the protective ground wire tester, measure the resistance between the mains grounding connection (incl. mains cable) and any metallic part of the stand and generator which the patient/operator may come in contact with.

The protective ground resistance must not exceed 0.2  $\Omega$ .

## Face shield



MAM00144

*Figure 5 Face shield*

- 1 Slide the face shield (1) onto the holder for external diaphragms.

## Warning label on control panel

The control-panel warning label comes in eleven languages; English, German, French, Spanish, Italian, Dutch, Danish, Norwegian, Finnish, Greek, and Swedish. The warning labels are found in a plastic bag under thumb index 3 in the Technical Manual.

*Note!*

*Warning label in english is provided on delivery.*

Choose appropriate language and affix the label over the existing label on the control panel, see Fig. 5. Be sure to position the label properly before affixing it. The label sticks immediately.

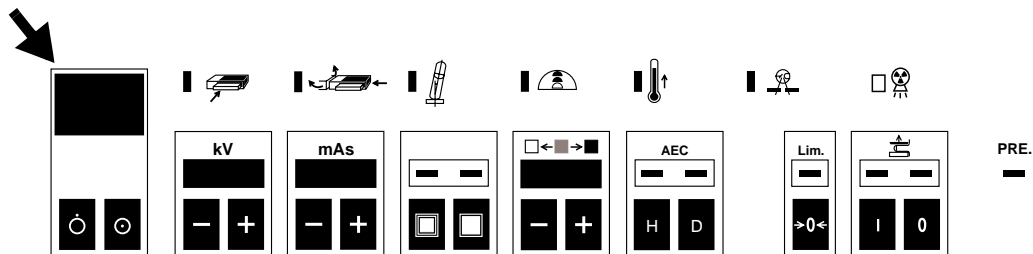


Figure 6 Warning label on control panel

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## Bolting the stand/generator to the floor

Should a permanent fastening to the floor be required due to local regulations (for example in earthquake areas) or due to the quality of the floor covering, the stand/generator can be secured to the floor by means of the levelling screws (1) of the stand or the fixing holes (2) of the generator.

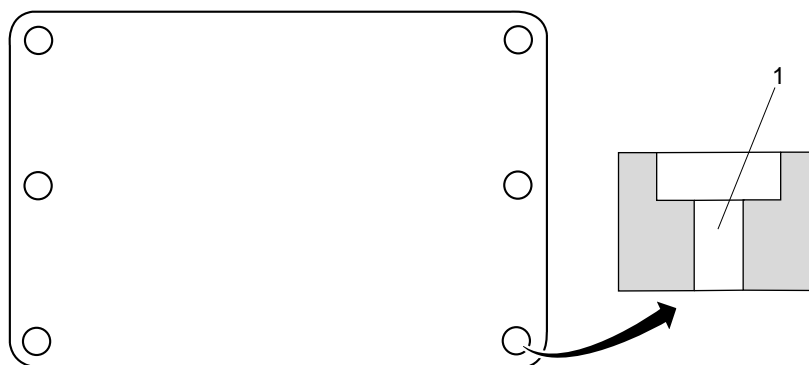


Figure 1 Base plate for the stand

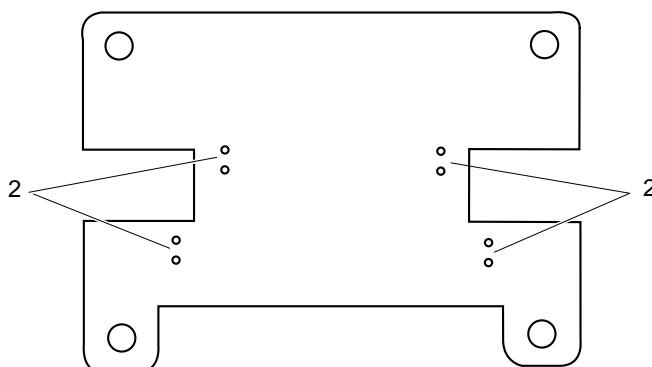


Figure 2 Base plate for the generator

- 1 Position the stand/generator and mark out appropriate fixing holes on the floor, using the base plate as a template.

**NOTE!**

*The base plates shall be secured with at least four screws each (two on each side).*

- 2 Drill the holes and insert dowels and screws use Liebig safety dowel M6 S10/35 and washer DIN 9021B, ISO 7093 or equal. Tighten the screws to 10 Nm.

**NOTE!**

*Make sure that the screws don't come in contact with any conductive material such as reinforcing iron.*



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## Working with the service PC

### Description of the syntax used in these instructions

< ..... >	The indication of which function keys to press is given between these characters, for example <ENTER>, <ESC> etc.
CAPITALS	Capital letters indicate data which must be entered unchanged, for example the name of a register, files etc.
<i>Italics</i>	Italics represent data in which a value should be entered, e.g. for user name, the name of the technician should be entered.
[ ..... ]	Square brackets enclose additions to commands which may be optionally entered.
<b>Bold</b>	Data relating to formats, user entries etc., which is important for the following entry, is shown in bold as it appears on the monitor screen.
_____	This character indicates that at this point the space key must be pressed.
xx yy zz	Data can be entered in place of "x, y, z" (e.g. day's date).
{ ... }	Curved brackets indicate that out of several terms listed one below the other, one must be selected.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Notes!</div>	Important remarks are indicated with this box.
* * * * *	When the password is entered, only these characters are shown.
Menu Selection:	When several menus, programs, files etc. are presented for selection, they are shown in a box (program window). Selection is made with the <↓> and <↑> keys. The module selected is highlighted in the display.
<ENTER>	Every entry must be confirmed with the <ENTER> key.
<ESC>	ESC allows paging back through the program.
<xx> + <y>	Some functions are selected by pressing two keys simultaneously. Procedure: Press, for example, the <Shift> key and keep it depressed, press the <*> key and then release both keys.
<F1>	Key <F1> calls up a selective help text.
<F10>	Key <F10> exits the program.

**XXX - - XXX - -** By this means, the way is shown how to call up a particular sub-routine (display windows).

For example:

**Main menu —**  
**Configuration —**  
**Iontomat —**  
**Corr. curve —**

**Note: S3 on D702 in upper position**

## Connecting the service PC

The service PC must be connected with connecting cable part no. 99 00 440 RE999 to p.c. board D702 in the generator (do not insert the diskette in the drive yet). **Use port COM 1 on the service PC.**

### Starting up and using the service PC

- 1 Switch on generator and service PC.  
 After initialization, the service PC shows: **C:\>**
- 2 Now insert the diskette with the service program.
- 3 Select the appropriate drive  $\begin{Bmatrix} \text{A:} \\ \text{B:} \end{Bmatrix}$  and then press <ENTER>.  
 The screen shows: **A:\>** or **B:\>**
- 4 Select the service program required, for example SERVICE, then press <ENTER>.  
 The program asks for user name: **User name**  
 Enter the name of the technician, for example NN, and then press <ENTER>.
- 5 The program asks for the password: **Password**  
 Enter the password (\*\*\*\*\*) and then press <ENTER>.  
 The display window shows: **Main menu**
- 6 Select the program part to be used with keys <↑> and/or <↓>, then press <ENTER>.  
 The program part selected is shown with a background: **Configuration**  
 If necessary, additional subroutines can be similarly selected here.
- 7 Make the necessary entries in the appropriate part of the program.  
 Save the entered data with <F2>. Page back in the program with <ESC>.  
 The appropriate instructions are shown on the monitor.
- 8 End the procedure with the service PC with <F10>.

---

## Measuring protocol

Values recorded during installation of Mammomat 300:

### **Tube P49 Mo, molybdenum anode 0.3**

Calculated values

\_\_\_\_\_ V x 5 kV/V = \_\_\_\_\_ kV

\_\_\_\_\_ V x \_\_\_\_\_ s x 40 mA/V = \_\_\_\_\_ mAs

Required values

30 kV +/- 5 %

20 mAs +/- 10 %

Date: \_\_\_\_\_

Sign: \_\_\_\_\_

### **Tube P49 Mo, molybdenum anode 0.15**

Calculated values

\_\_\_\_\_ V x 5 kV/V = \_\_\_\_\_ kV

\_\_\_\_\_ V x \_\_\_\_\_ s x 40 mA/V = \_\_\_\_\_ mAs

Required values

30 kV +/- 5 %

10 mAs +/- 10 %

Date: \_\_\_\_\_

Sign: \_\_\_\_\_

Keep measuring protocol in technical documentation.

**Tube P49 Mo, molybdenum anode 0.3**

40 mm plexiglass

Calculated values

\_\_\_\_\_ V x 5 kV/V = \_\_\_\_\_ kV

\_\_\_\_\_ V x 40 mA/V = \_\_\_\_\_ mA

Required values

30 kV +/- 5 %

125 mA +/- 10 %

Date: \_\_\_\_\_

Sign: \_\_\_\_\_

**Tube P49 Mo, molybdenum anode 0.3**

40 mm plexiglass

Calculated values

\_\_\_\_\_ V x 5 kV/V = \_\_\_\_\_ kV

\_\_\_\_\_ V x 40 mA/V = \_\_\_\_\_ mA

Required values

30 kV +/- 5 %

125 mA +/- 10 %

Date: \_\_\_\_\_

Sign: \_\_\_\_\_

Keep measuring protocol in technical documentation.